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TELEVISION COURSE—INSTALLMENT No. 11

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The PHOTOFACT Servicer

OCT. 15, 1948 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ VOL. 5, No. 48

ROBERT M. ELLIS, *Editor*

C-D ANNOUNCES VIBRATOR LINE

Octave Blake, president of Cornell-Dubilier Electric Corporation of South Plainfield, New Jersey, announces that the company, for the first time in its history, is offering to the trade through its regular jobber and manufacturing channels, products other than capacitors.

The new products are light duty vibrators, heavy duty vibrators and vibrator power supplies. They will be ready for distribution on September 1, 1948. The light duty vibrators are a development of the Cornell-Dubilier engineering laboratories. They are used principally in automobile radio equipment to furnish the necessary alternating current power from storage batteries.

By the purchase of $200,000 on August 17, 1948, of the business, goodwill, trademark, patents and inventory of The Electronic Laboratories, Inc., 24 West 24th Street, Indianapolis, Indiana, the world's largest manufacturers of vibrator power supplies, the company acquired a recently improved and new design of heavy duty vibrator and vibrator power supply.

These products are used in industrial equipment, such as converters and frequency changers for the operation of electric razors on Pullman cars, new and improved fluorescent lighting on buses, radio transmitters, direct current television, medical and dental equipment and on the farms that have small 32 volt generator plants and desire to use standard 110 volt AC food mixers, sewing machines, fans and the like. All auto radio receivers require vibrators.

Replacement listings of Cornell-Dubilier Vibrators will appear in PHOTOFACT Folders in the near future.

★ ★

MICA CAPACITOR COLOR CODES

A Bulletin Prepared by the Service Committee of the Radio Manufacturers Association of Canada

Determining the nominal capacity and tolerance limits of mica dielectric capacitors, from examination of the color coding, is a simple matter provided the examiner knows which code has been used by the manufacturer.

During the last ten years, about a half-dozen different codes have been used both in Canada and the U.S.A. Much of the equipment manufactured during this period is still in existence, and it is frequently the lot of the service technician to read these codes due to capacitor failure or for the purpose of modifying existing circuits.

Fortunately, most of the several codes have identifying characteristics. Let us then review the situation in an effort to familiarize ourselves with these "points of difference" which may be considered as guides to the code being examined.

The first to be considered is the familiar "Three-Color Code" which looks like this:

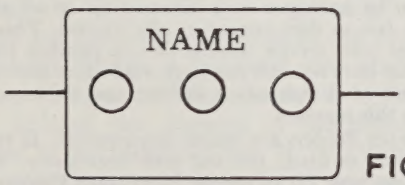

FIG. 1

The first dot represents the first significant figure, the second dot the second significant figure, and the third dot the number of zeros or the decimal multiplier. EG: A code reading green, black, brown would signify 50 and 1 zero or 500 mmf. A code reading green, black, gold would signify 50 x .1 or 5 mmf. This code is usually used when when the capacity tolerance is 20 per cent, and the working voltage is 500 VDC.

To extend the usefulness of the above code, a fourth dot is added to indicate the plus or minus tolerance of the nominal capacitance. The fourth dot is placed in the upper left hand corner and the code appears like this:

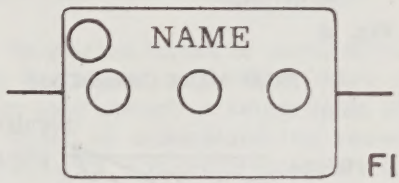

FIG. 2

When still further information is to be imparted, a code using six dots is used. Herein lies the source of confusion and strict caution should be observed whenever a six-color coded capacitor is to be read. There are three distinct codes using six colors and the first step to reading any one of them is to determine which code has been used. All of these codes appear like this:

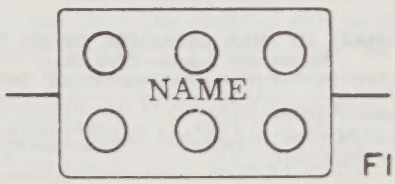

FIG. 3

The identifying characteristics are:

(1) If the upper left-hand dot is BLACK, it is the JAN (Joint Army-Navy) code. (Fig. 6)

(2) If the upper left-hand dot is WHITE, it is the RMC (RMA-Capacitor-Mica Dielectric). (Fig. 7)

(3) If the upper left-hand dot is neither black nor white, it is probably the now obsolete RMA six dot color code. The old RMA code may have the first dot colored white if the capacitance is between 900 and 999 mmf. This range, however, is very seldom used. (Fig. 8)

(1) In the JAN code, the black upper left-hand dot signifies a mica dielectric capacitor. The upper middle dot signifies the first significant figure of the nominal capacitance. The upper right-hand dot is the second significant figure. The lower right-hand dot is the number of zeros or decimal multiplier. The lower middle dot is the plus or minus tolerance of the nominal capacitance. The lower left-hand dot signifies the capacitor characteristic and is too involved to be discussed here. In normal service work it may be ignored.

(2) The RCM code is identical to the JAN code with the exception of the color of the upper left-hand dot. Both codes are read in exactly the same manner.

(3) In the RMA six-color code the upper row of dots represents the first three significant figures of the nominal capacitance. The dots are read from the left to right. The lower right-hand dot represents the number of zeros or decimal multiplier. The lower middle dot represents the plus or minus tolerance of the nominal capacitance. The lower left-hand dot represents the rated direct current working voltage.

Standard general purpose mica dielectric capacitors are usually housed in a brown bakelite case and are used in most radio applications. Wherever higher insulation resistance, higher Q, lower power factor and more stable characteristics are required, a low loss bakelite is used and is usually colored yellow. For the most critical applications which require precise capacitance values and extreme stability, silvered mica capacitors are used and are usually colored red.

When arrows are not used, dots are read from left to right with printing on case upright.

When both rows of dots are not on one face, rotate capacitor about axis of its leads to read second row on side or rear.

3-Dot Color Code

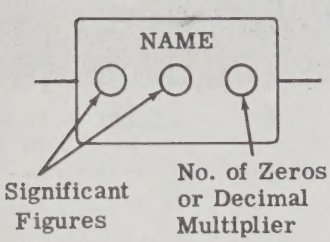

FIG. 4

4-Dot Color Code

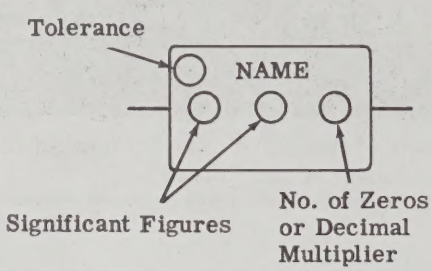

FIG. 5

JAN 6-Dot Color Code

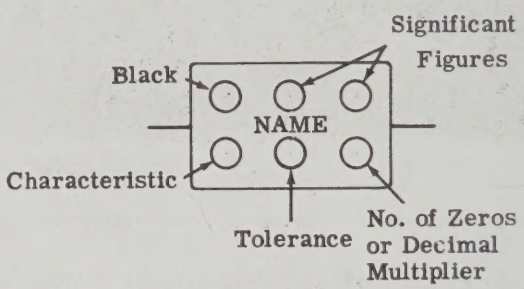

FIG. 6

RCM 6-Dot Color Code

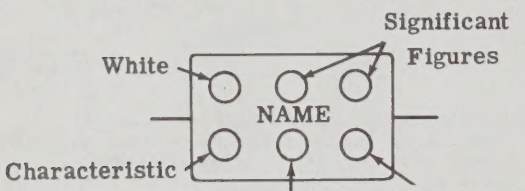

FIG. 7

6-Dot RMA Color Code

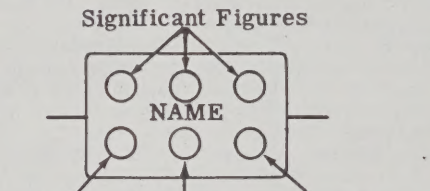

FIG. 8

SUMMARY OF MICA CAPACITOR COLOR CODES

Molded Mica Capacitor Color Codes
Color Significance for RMA Capacitor Color Codes

Color	*Significant Figures or No. of Zeros, or Decimal Multiplier*	*Volts DCW*	*Capacitance Tolerance %*	*Characteristic**
Black	0	—	20	A
Brown	1	100	1	B
Red	2	200	2	C
Orange	3	300	3	D
Yellow	4	400	—	E
Green	5	500	5	F
Blue	6	600	—	G
Violet	7	700	—	—
Grey	8	800	—	I
White	9	900	—	J
Gold	.1	1000	5	(JAN-C-5 Code only)
Silver	.01	2000	10	
None	—	—	20	

* In some 6-dot codes these letters describe combinations of various electrical characteristics.

Reprinted from "Radio and Appliance Sales" magazine for July, 1948, through the courtesy of Robert C. Poulter, Managing Editor, Poulter Publications Limited, 54 Bloor Street West, Toronto 5, Canada.

★ ★

FIELD EXPERIENCES

Here is your opportunity for passing practical service experiences to others for the benefit of all. For every service "Field Experience" published, we issue to the author a certificate that is good for one PHOTOFACT Folder Set. Since it is impossible to verify the accuracy of contributions, we cannot be responsible for either the diagnosis made of the receiver trouble, or the results which will be obtained by following the suggested repair routine. All contributions become the property of Howard W. Sams & Company, Inc.

★ ★

ZENITH 6R087 (Ch. 6C22)
Photofact 467-32, Set 7

"In the Zenith 6R087 both supporting members attached to the loop frame are of metal; the corresponding stationary members are made of wood at the bottom, and metal at the top. Severe noise generated by the top pair can be eliminated by substituting a wood block for the iron bracket."

Submitted by: Mr. R. H. Jule
Box 213, Greenbelt, Maryland

GENERAL ELECTRIC 250 PORTABLE
Photofact 464-13, Set 4

"Complaint: Noisy reception.

"The trouble was caused by leaky primary in the r.f. coil, Item 50. Replacing this coil completely eliminated the noise."

Submitted by: Mr. Ralph E. Gaskins
Radiotrician, Homerville, Georgia

★ ★

HIGH HISS LEVEL

"When A.C. sets using Pentagrid Converters of the 6A7 and 6A8 type set up a howl and rushing sound over the tuning range, check the resistance of the anode grid dropping resistor. This resistor frequently decreases with age resulting in an abnormally high voltage being applied to the anode grid. This potential should not exceed 200 volts maximum."

Submitted by: Mr. C. W. Battels,
Battels Radio-Electronics Service
559 Wooster Avenue, Akron 7, Ohio

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If you have been unable to get PHOTOFACTS, send your order directly to us and we will see that you are supplied.

BLOCK DIAGRAMS: Television receivers usually employ many more circuits and tubes than other types of entertainment and communication sets. For this reason, functional or "block" diagrams are frequently employed in service literature as an aid in analyzing the more complicated circuit schematic diagram.

Any particular receiver can be represented by a block diagram in which the various tubes and their functions are represented by individual blocks. The attempt has been made in Figures 134 and 135 to present generalized block diagrams of those elements of both electrostatic and electromagnetic systems which have been covered to date. It will be realized that the choice of one particular television system for presentation must involve only one means of accomplishing the desired circuit operations and that different diagrams may be drawn for other circuit combinations.

The block diagram indicates the sequence of circuit performance by means of "flow" arrows between the various boxes which represent distinct circuit elements.

The television service technician is urged to study these diagrams as well as those available in the service literature since they constitute an excellent method of studying the entire television system.

COMPOSITE TELEVISION SIGNAL (A RADIO CARRIER MODULATED BY VIDEO AND AUDIO)

In our study of the television system up to this point, we have considered the actions of the circuits associated with the picture tube, enabling it to produce a replica of the image focused on the camera tube at the transmitter. At several points in the text, the statement has been made that as the electron beam is being swept across the screen of the picture tube to produce a horizontal line, it is simultaneously being modulated in intensity in accordance with the video signal. We will now examine the nature of the radio carrier wave with its video (sight) and audio (sound) modulation.

The principles underlying the interception of the waves by special antennae, R-F amplification, detection, subsequent I-F amplification, and conversion to a modulating video signal, will be covered in the order of signal progression through the receiver.

We have now analyzed those elements of a television receiver which are pulse-controlled or under "slave" action. We can now logically cover those parts of the receiver which accept the transmitted television signal and use it to produce audio and video output voltages.

The television signal is much more complex than broadcast and short wave signals which carry only speech or telegraphic information. In order to understand the reasons for the necessary complexity of the television signal, a short review of the composition of the familiar broadcast band amplitude-modulated carrier will precede the description of the television carrier.

During the amplitude modulation of the carrier wave by speech or music, frequencies higher and lower than the carrier are produced, known as "side-bands". These occur as a result of the beat or heterodyne between the carrier frequency and the modulating frequency. In the broadcast band for example, the highest modulating frequency for speech or music transmission is approximately 5,000 cycles per second. Thus, if a broadcast station is operating at 1,000kc (one million cycles) the 5,000 cycle top modulation will produce side-bands which extend from 1,000,000 cycles minus 5,000 cycles to 1,000,000 cycles plus 5,000 cycles (995kc to 1005kc). A graphic representation of such a double side-band modulated broadcast carrier is shown in Figure 133.

The modulating frequencies encountered in the video signal of television extend from less than 30 cycles per second to over 4,000,000 cycles per second. It will be interesting to examine the reasons for this tremendous frequency range in the output of the transmitter camera tube.

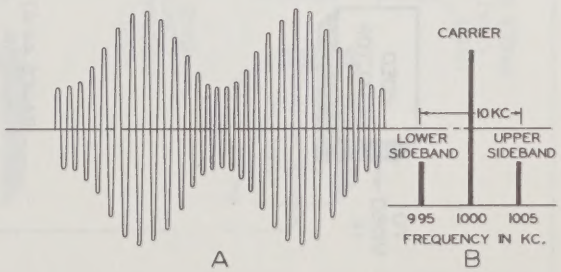

Fig. 133. Double Side-Band Modulated Carrier Wave. 50 Percent Modulation - 5,000 Cycle Tone

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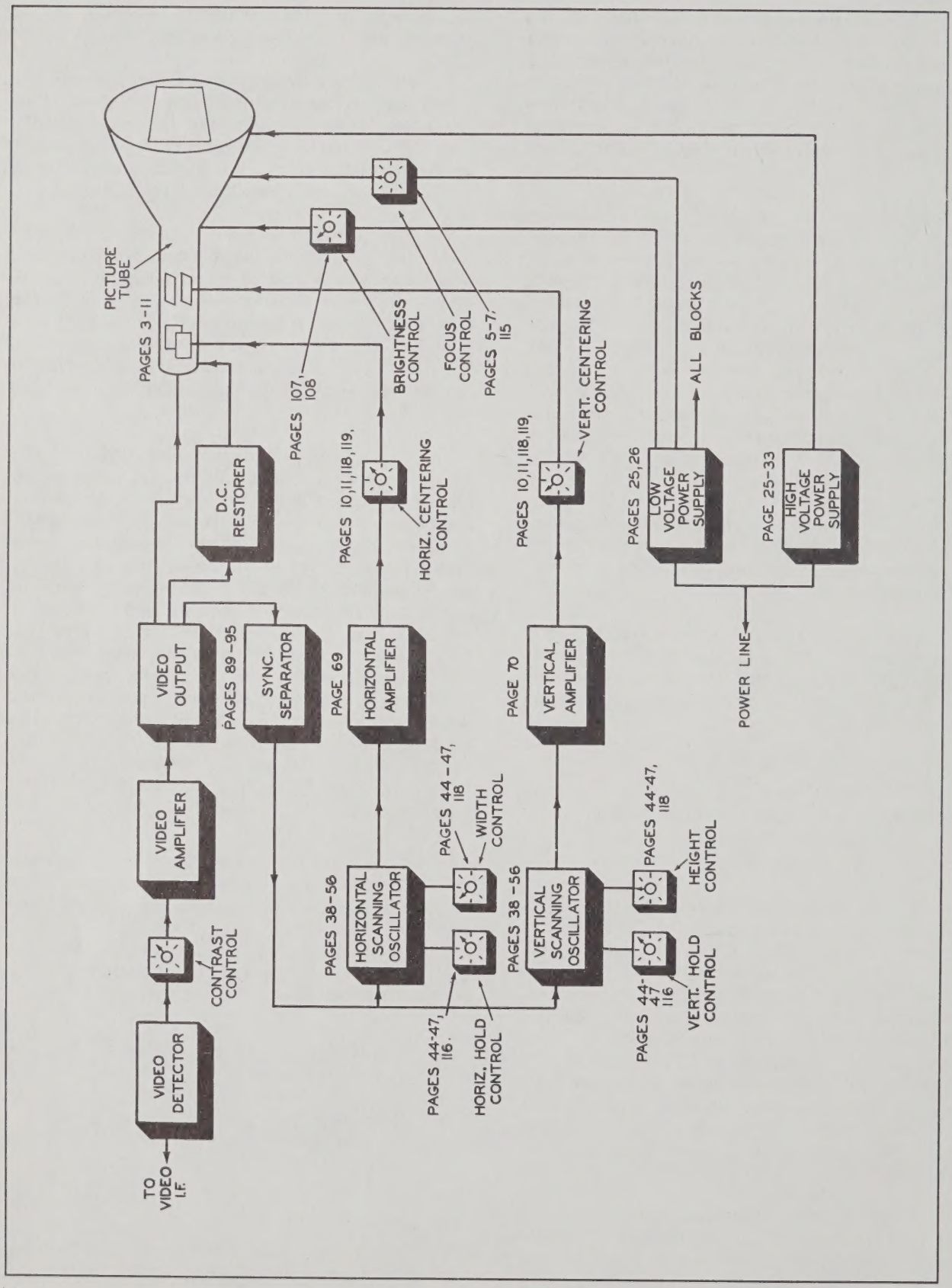


Fig. 134. Functional Block Diagram - Electrostatic Type. Supply, Deflection, Synchronization and Control Circuits

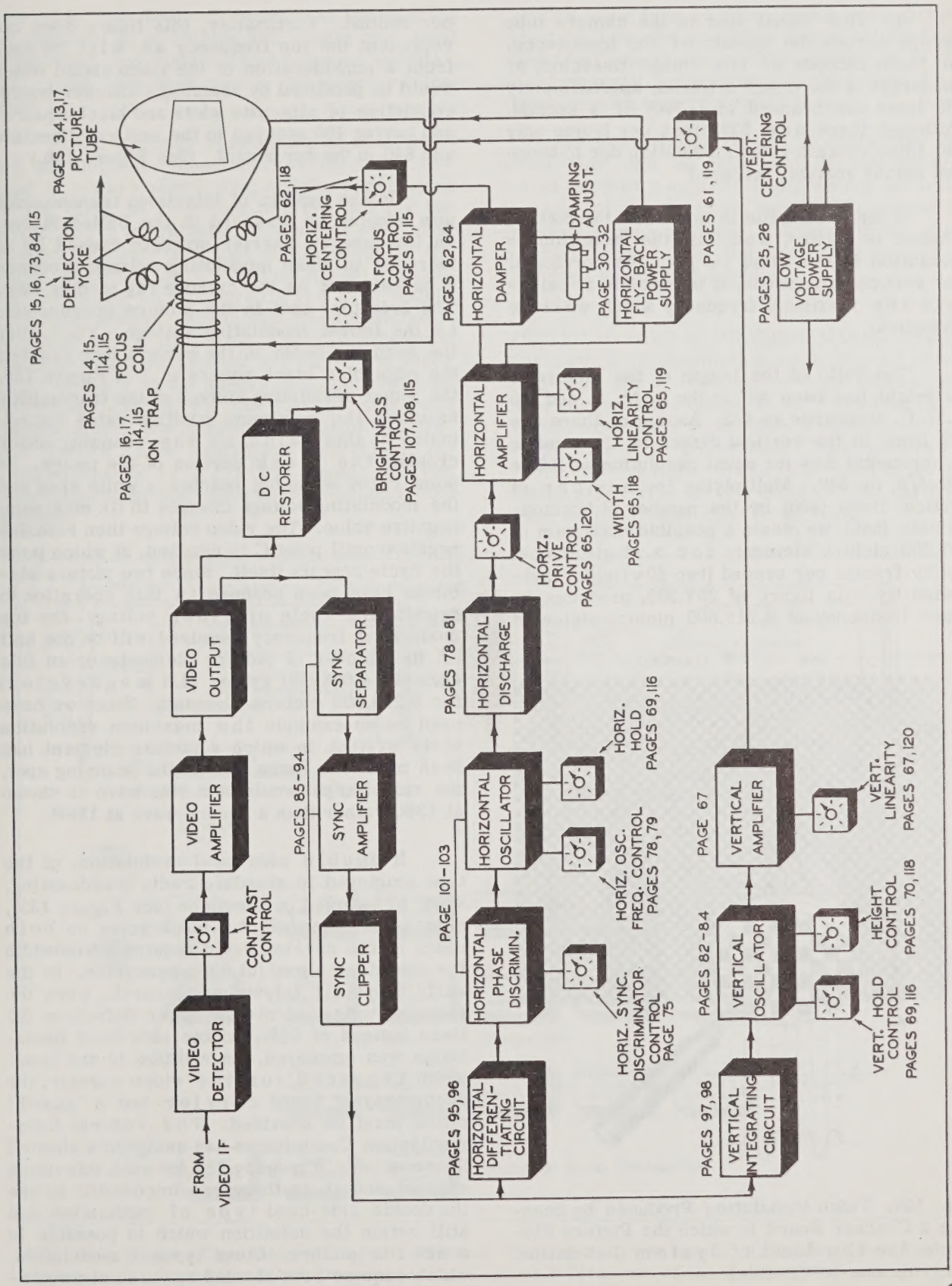


Fig. 135. Functional Block Diagram - Electromagnetic Type. Supply, Scanning, Deflection, Sync, and Control Circuits

As the signal spot in the camera tube sweeps across the mosaic of the iconoscope, the photo cathode of the image dissector, or the target of the image orthicon, approximately 480 lines are scanned in 1/30th of a second. (Although there are 525 lines per frame only 480 lines contain video modulation due to those lost during vertical retrace.)

If the assumption is made that the picture element is square, and that the definition or resolution is the same in both the horizontal and vertical directions, it is possible to calculate the maximum frequency which will be produced.

The ratio of the length of the picture to its height has been set in the R. M. A. and the F. C. C. standards as 4/3. Assuming there are 480 lines in the vertical direction, the number of horizontal dots for equal resolution would be 480x4/3, or 640. Multiplying the number of vertical lines (480) by the number of horizontal dots (640) we obtain a possible maximum of 307,200 picture elements for a single frame. Thirty frames per second (two 60~fields) multiplied by this figure of 307,200, produces an upper frequency of 9,216,000 picture elements per second. Fortunately, this figure does not represent the top frequency as will be seen from a consideration of the video signal which would be produced by scanning a checker board, consisting of alternate white and black squares and having 480 squares in the vertical direction and 640 in the horizontal. (See Figure 136.)

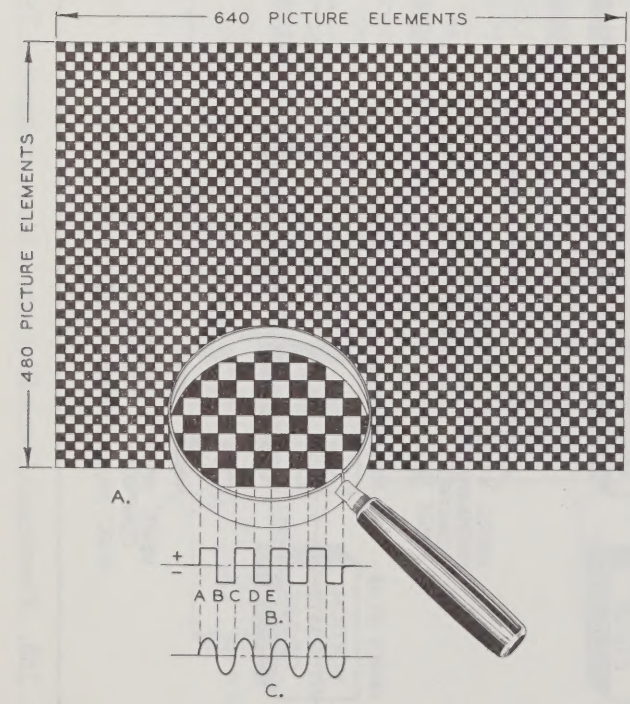


Fig. 136. Video Modulation Produced by Scanning a Checker Board in which the Picture Elements Are the Limit of System Resolution. (Diagram one-tenth scale)

In the system of television transmission now adopted as standard in the United States, an increase in carrier strength caused by an increase in video modulating voltage produces a darker spot on the cathode ray picture tube. The brightest spot in the picture corresponds to the lowest modulating voltage. Thus when the scanning beam in the camera tube reaches the edge of a black square at A of Figure 136, the video modulating voltage of the transmitter assumes its maximum positive value and remains at this value as the scanning action crosses the black portion of the image. At point B the scanning reaches a white area and the modulating voltage changes to its maximum negative value. The video voltage then remains negative until point C is reached, at which point the cycle repeats itself. Since two picture elements have been scanned in this operation to produce one cycle of video voltage, the top modulating frequency required will be one half of the number of picture elements or in this example 4,608,000 cycles (4.6 megacycles) for 9,216,000 picture elements. Since we have used as an example the maximum resolution of the system, in which a picture element has been made the same size as the scanning spot, the video output would be a sine wave as shown at 136C rather than a square wave at 136B.

If double side-band modulation, of the type employed in standard radio broadcasting, were to be used in television (see Figure 133), side-bands extending 4.5 megacycles on both sides of the carrier would require a bandwidth for the video signal of 9.0 megacycles. In the early days of television research, when the pictures were of much lower definition (90 lines instead of 525), double side-band modulation was employed. In addition to the bandwidth required for the video carrier, the accompanying sound carrier and a "guard" space must be provided. The Federal Communication Commission has assigned a channel space of only 6 megacycles for each television channel and it is therefore impossible to use the double side-band type of modulation and still retain the definition which is possible in a 525 line picture. Other types of modulation, which require less channel space to accommo-

date the wide band of modulation frequencies encountered in television are; single side-band modulation, and vestigial side-band modulation. (One side-band plus a "vestige" of the other.)

In the process of detecting or demodulating an amplitude modulated carrier, one side-band is always eliminated, and the information in the other is amplified and utilized for the production of the picture. The single side-band method requires only half of the space in the radio spectrum for a given maximum modulating frequency as compared with the double side-band method. Single side-band modulation is produced by passing a double side-band modulated carrier through a radio frequency filter network which suppresses the undesired side-band. Although the single side-band method allows the greatest utilization of channel space, it is considered impractical for transmission of television signals, and has been replaced by the vestigial side-band method because:

1. The type of filter which must be employed for the complete suppression of one side-band introduces serious distortion of the low frequency components of the video signal which results in a "blurred" picture.

2. Even though means of correcting the phase shift may be developed, the single side-band method requires extremely accurate tuning of the receiver and a high degree of freedom from oscillator frequency drift. Otherwise, a loss of the low frequency portion of the video modulation results.

VESTIGIAL SIDE-BAND VDIEO MODULATION: The system of modulation employing all of one side-band and a "vestige" of the other has been adopted as standard in the United States to overcome the difficulties encountered with single side-band modulation. The fact that a "part" or "vestige" of one side-band is transmitted gives rise to the name of the method, i. e., vestigial side-band modulation.

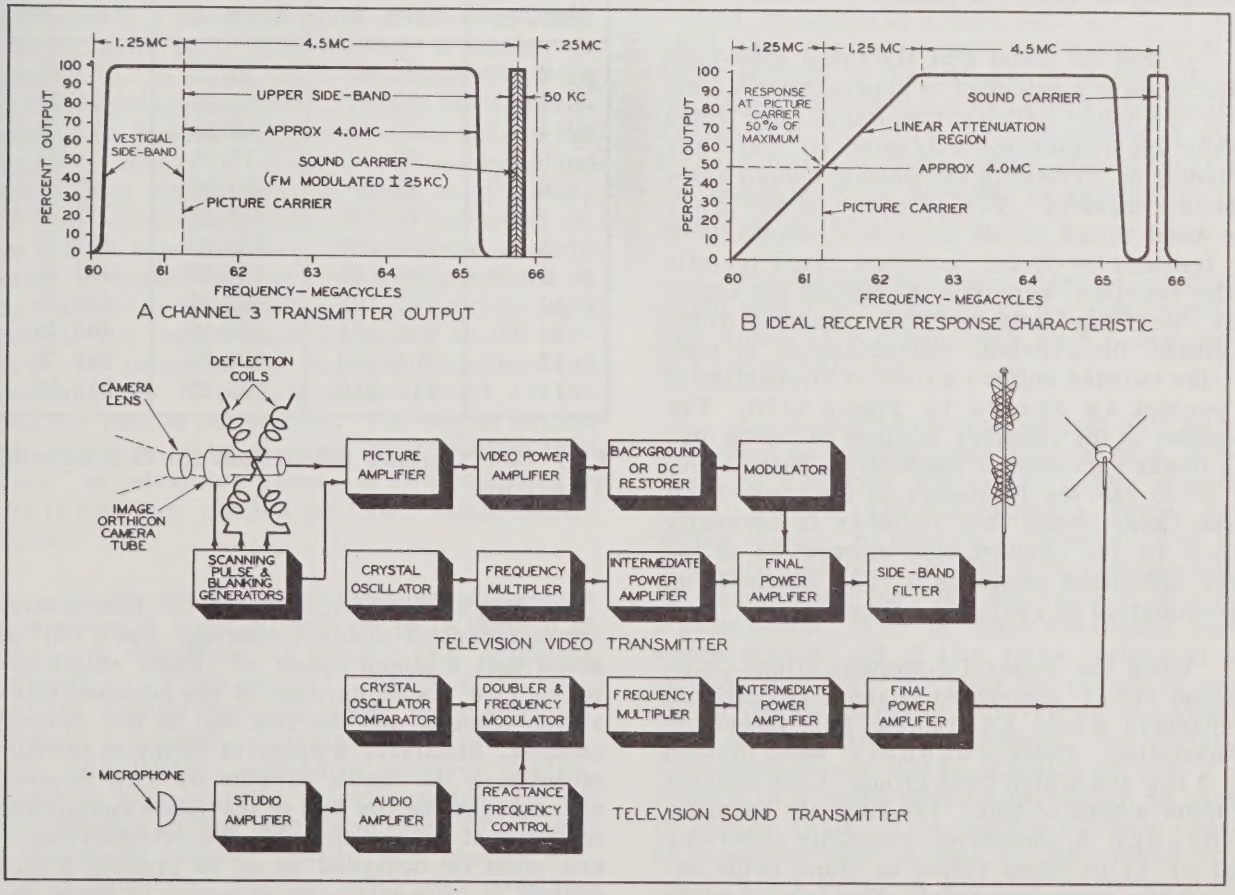


Fig. 137. Output Characteristic of a Television Transmitter, the Required Receiver Response Characteristic, and the Block Diagram of the Essential Elements of the Transmitter

Figure 137A shows a typical television channel employing vestigial side-band modulation. Channel No. 3 has been chosen for this example. A block diagram of the essential parts of the transmitter to produce this type of carrier and modulation, is shown in Figure 137C.

It will be seen that, in this channel which extends from 60 to 66mc, the picture carrier frequency is placed 1.25mc above the lower limit of the channel or at 61.25mc. Video modulation of this carrier produces an upper side-band with frequencies extending to approximately 4mc. The accompanying sound of the program has a carrier frequency 4.5mc above the video carrier, or - in this case - at a frequency of 65.75mc. A guard channel, or space, of .5mc separates the video modulation from the sound channel. The sound produces a frequency modulation of its carrier with a maximum deviation of 25kc (a total carrier swing of 50kc). Between the sound carrier and the upper end of the channel (66mc) is another guard band, or space, of .25mc.

It will be noted that the lower side-band frequencies are extended to approximately 1 mc below the video carrier frequency. For video modulation frequencies extending to 1mc the transmitting system is essentially double side-band in character. The presence of the lower side-band would result in an over-emphasis of low frequencies if the response characteristic of the receiver were flat throughout the entire band. To compensate for this possible over-emphasis, the receiver characteristic is such that the carrier suffers a loss or attenuation of 50 percent as shown in Figure 137B. The response of the receiver is made to "drop off" at a linear rate from a frequency 1.25mc above the video carrier frequency to the lower limit of the band. When the receiver is correctly tuned to the channel, this attenuation of the lower side-band produces a flat output from approximately 25 cycles to 4.5mc.

When the Federal Communications Commission first announced channel allocations, 13 channels were assigned for television broadcasting. These channels were divided into a low and a high band group. Each channel occupies a band of 6mc. The first six channels (1 through 6, inclusive) originally covered a band of 44 to 88mc (72mc to 76mc being reserved for other services). The second group of seven channels (7 to 13 inclusive) covered a band of 174 to 216mc. The lowest frequency channel (No. 1, 44 to 50mc) has been eliminated from the assigned group, and at this time there is some indication that channel No. 13 (210 to 216mc) may also be denied for television broadcasting.

Field experience now being correlated indicates that the original frequency assignments for various cities may cause interference fringes in those sections of the country, where the signal level from a distant city on the same channel is comparable to that of the desired signal. The entire situation is being studied by the F. C. C., and the J. A. T. C. (Joint Advisory Technical Committee). New assignments, reassignments of issued licenses, and the possible opening of new television bands, will await the result of the F. C. C. investigation and hearings. Receivers now in use can be tuned to the channels indicated in the following table.

Channel Number	Channel Freq. Mc	Picture Carrier Freq. Mc	Sound Carrier Freq. Mc
2	54-60	55.25	59.75
3	60-66	61.25	65.75
4	66-72	67.25	71.75
5	76-82	77.25	81.75
6	82-88	83.25	87.75
7	174-180	175.25	179.75
8	180-186	181.25	185.75
9	186-192	187.25	191.75
10	192-198	193.25	197.75
11	198-204	199.25	203.75
12	204-210	205.25	209.75
13	210-216	211.25	215.75

Fig. 138. Channel Allocations for Commercial Television

Figure 139 illustrates the consecutive arrangement of channel spacing, and it will be noted that a guard space of .25mc exists between the sound carrier of the adjacent television channel and the low end of the desired channel. Similarly a space of .25mc is provided between the sound carrier of the desired channel and the low end of the video modulation of the next higher channel. Television receivers must be designed so as to provide a high degree of attenuation or rejection of these undesired transmissions occurring in adjacent channels.

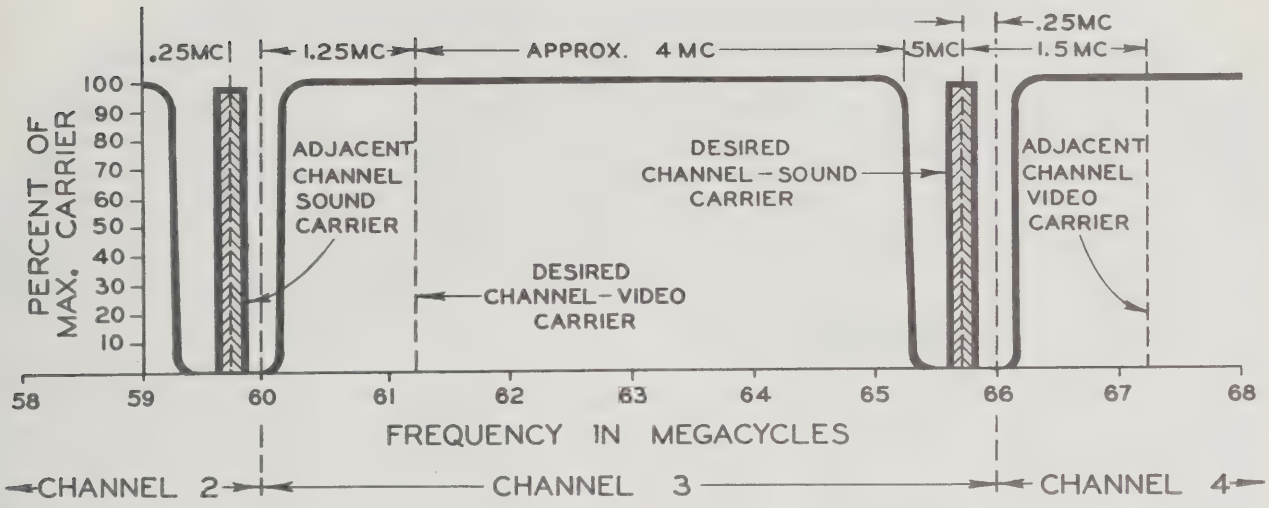


Fig. 139. Arrangement of Consecutive Channel Spacing for Television Channels 2, 3 and 4

THE VIDEO MODULATION: Figure 140 shows the nature of the video signal which would be produced if a card, carrying a series of tones ranging from pure white through a number of gray values to black, were to be placed in front of the television camera. Figure 140A represents one horizontal line scanned across the series of tones. The line is preceded and followed by pedestals upon which are "mounted" the horizontal synchronizing pulses. At the left of this figure will be found a scale which indicates the percentage modulation of the carrier corresponding to the various light values. The region from 75 percent to 100 percent is reserved for scanning impulses and therefore the 75 percent point itself is the blackest part of the picture. The region beyond this black point is known as "blacker than black" in television slang. It is also known in engineering circles as the "infra-black" region.

At the other end of the modulation scale at a value of from 10 percent to 15 percent of maximum amplitude, is found the brightest highlight or "white region". The F. C. C. regulations specify that this white level shall not exceed 15 percent of maximum carrier amplitude. One basic method of receiver design, known as inter-carrier sound, requires for its performance a white level of at least 10 percent of maximum carrier, and, for this reason, television broadcast stations must now hold the white level of transmission within quite narrow limits.

The intermediate gray tones occupy positions between the two extremes just discussed, as shown in Figure 140A and C. Figure 140A shows a series of tones in which the white portion of the picture is at the left and the black portion at the extreme right, while in Figure 140C is shown a succession of white through black to white again, and in this case the black level or pedestal is reached at the center of the active scan.

The television video carrier envelopes which would be produced by the video modulating waves of Figures 140A and C are shown in Figures 140B and D.

An actual television subject will be represented by continuously varying tone values along each of the 470 to 480 active scanning lines. Figure 141A illustrates a typical television image. In this case, however, the line structure has been produced by approximately 75 lines rather than the 480 lines of an actual transmission. One of these horizontal lines, which crosses all of the tone values of the subject, has been analyzed for change of video signal due to the major differences in reflected light intensity from the subject. The variation of camera signal, due to scanning the line X-X, results in a video modulating voltage as shown in Figure 141B. The sudden changes caused by crossing such regions as the eyeball-iris-pupil "catch light" of the eye, represent rapid excursions of the video voltage. For faithful reproduction of such sudden changes, the sys-

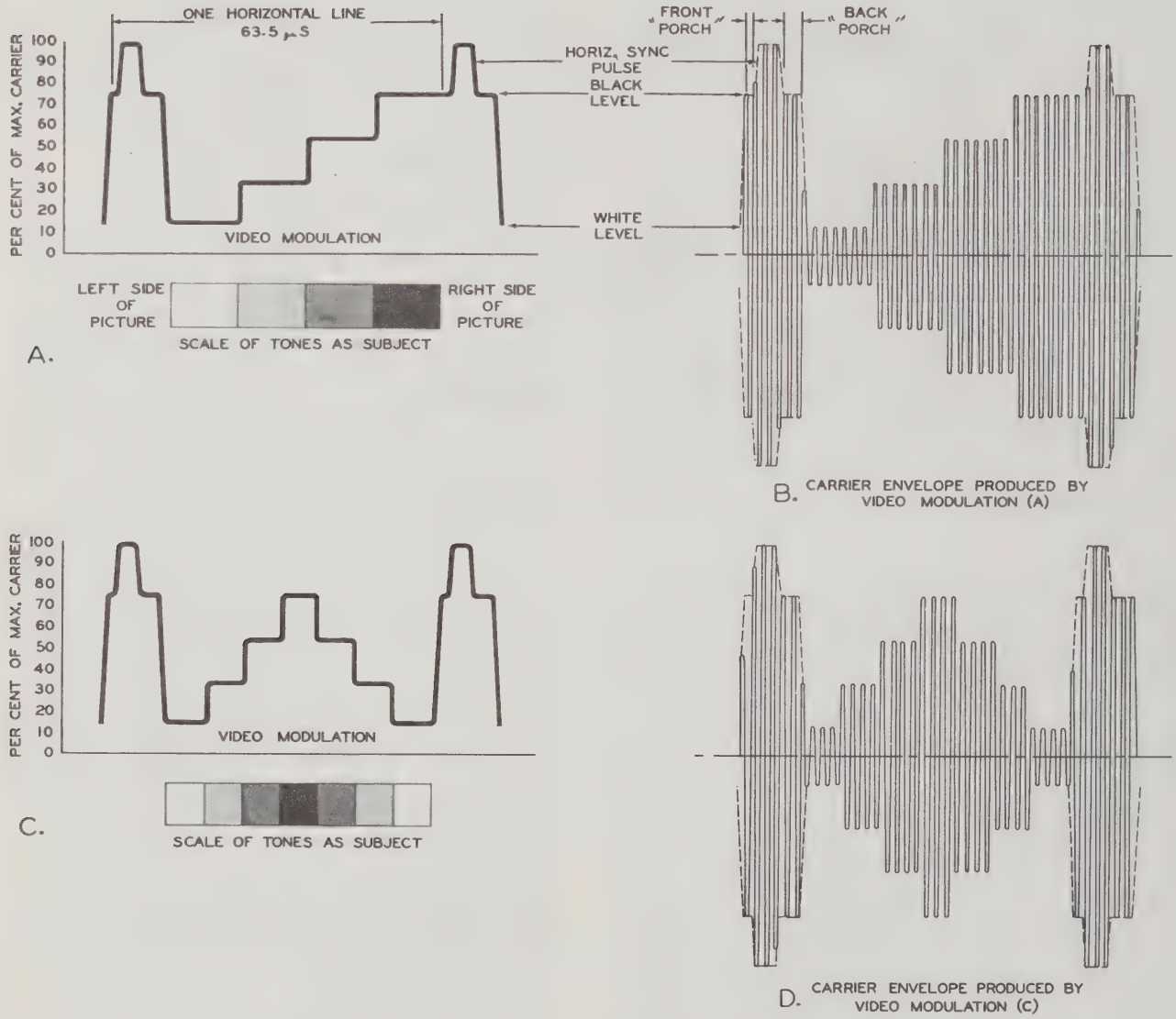


Fig. 140. Video Signal and Carrier Envelope Produced by Scanning a Range of Tones

tem must have extremely wide band response characteristics. Gradual variations, such as are represented by the slight variations of half-tone values in the flesh tones of the face, and gradual transitions of the shadow in the background can be accommodated by middle frequencies of the video band.

A number of times in our discussion of video modulation, we have indicated that an increase of carrier strength produces a darker picture until finally the spot on the picture tube is extinguished and produces a black dot. This is known as negative modulation and was chosen by the National Television Standards Committee (a radio industry group, which acted as an advisory committee to the F. C. C.) after trial of positive and negative systems both in the laboratory and in experimental field demonstrations. The reasons for the choice of negative transmission as the United States standard are:

1. Static and noises, both in the receiver and man-made sources, such as automobiles, oil burner ignition, electric razors, etc., should produce black spots on the picture in negative transmission, but would produce bright flashes of light if the video modulation were positive. The former condition is the least annoying.

2. In the negative system, both horizontal and vertical synchronizing pulses are at

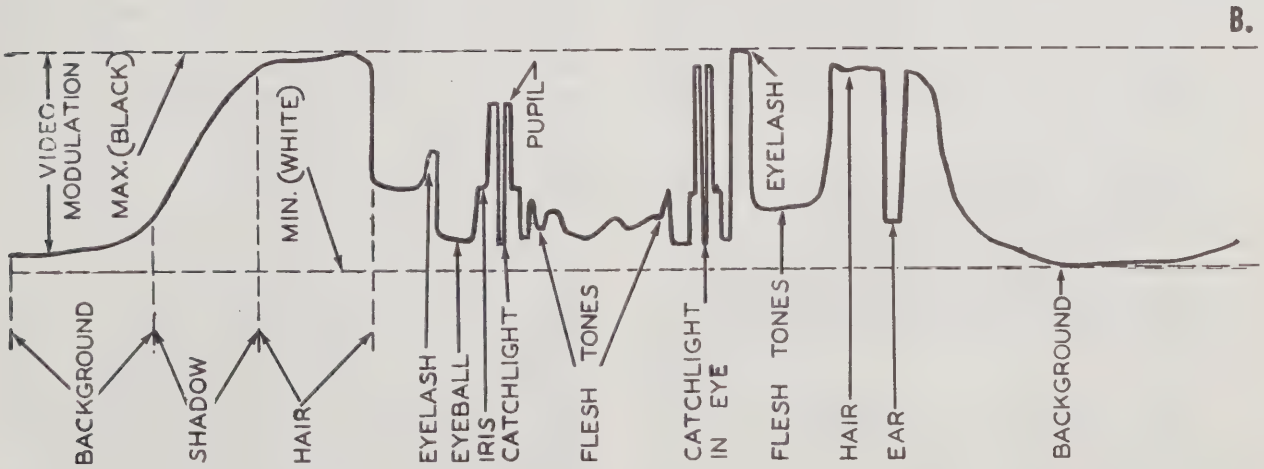


Fig. 141. Variation of Video Voltage Produced by Scanning Line X-X. (Typical Television Subject)

maximum carrier amplitude, assuring receiver synchronization with the transmitter even under conditions of low signal strength at the limits of the service area.

Television transmission on a commercial scale has been in progress in Great Britain for a number of years. The British system is based on positive transmission. A comparison of both systems under similar conditions is being conducted in Australia, and the results will undoubtedly be published in the technical publications. Unlike radio broadcasting, which can be received by many types of systems from a simple crystal detector to a complicated super-heterodyne, television is absolutely controlled by the choice of type of transmission, and for this reason the final decision of the F. C. C. on television standards was delayed for many years pending industry accord.

In the foregoing discussion of the nature of the video modulation caused by scanning the image in the camera tube, we have considered the polarity of the video voltage wave as becoming increasingly more negative as the scene being scanned grows darker. In each case the polarity illustrated (see Figures 140 and 141), is that required for the modulation of the carrier wave. The polarity of the video modulation envelope has been adopted in this discussion as a reference basis rather than the polarity of the camera tube, since the various camera types (see pages 19 through 23) do not all supply the same output polarity with decrease in intensity of the image.

The television service technician should at this time refer to the discussion of camera tube action covered in pages 19 through 23, since some text books and magazine articles may use, as illustrative material, the output wave of the camera tube rather than the video modulation envelope.

THE DIRECT CURRENT COMPONENT OF THE VIDEO SIGNAL: Video modulation differs basically from the audio modulation employed in sound broadcasting. It is in the form of a varying direct current rather than the familiar alternating current form of speech and music modulation.

The direct current component or "bias" corresponds to the average illumination of the scene being televised. This is equivalent to an average of the camera output for all of the lines comprising a frame-scanning interval. The camera tube itself produces an alternating voltage output which is proportional, at any instant, to the brightness of the particular picture element being scanned at that time. Since the output element of the picture tube (such as the mosaic of the iconoscope) is capacitance-coupled to the input grid of the camera amplifier, it is not possible for any direct current components of the picture tube output to be passed on to the succeeding stages. The remaining video amplifying stages of the transmitter are likewise capacitance-coupled and therefore not able to amplify the direct current component.

Direct current components in the video signal are due to those portions of the scene being televised which have no change in brilliance over a portion of a horizontal line. A uniform gray background, for instance, will produce a uniform, single value charge on that part of the mosaic, representing its image. As the scanning beam of the camera tube crosses this section, no change of output voltage will occur and consequently no alternating voltage will be passed on to the camera amplifier input.

If the average lighting of the scene or background were not taken into account, by the addition of the correct DC bias to the video modulator, the contrast or ratio of brightness of the various parts of the picture with respect to each other would be correct but the background illumination or shading would be incorrect.

Several instances of typical television subjects will serve to illustrate the effect on the received image, if the average or DC component were not transmitted:

1. A dancer dressed in a white costume with a black curtain as a background is chosen as the television subject. Let us assume that the television system, from camera tube to the receiving picture tube, has been adjusted so that the dancer's costume is rendered on the picture tube as a satisfactory highlight, and that the black curtain appears as "black". Let us now consider what will happen if several more dancers, similarly garbed in white, come on the scene. If the DC component representing the new average light value of the scene is present both in the transmitted carrier and restored at the picture tube, the scene will be reproduced correctly. If on the other hand the new DC bias were not provided at the transmitter, the highlights of the dancers would be rendered as gray and any gray areas in the background would disappear into the black area beyond cut-off.

2. As an opposite extreme to the example just cited, consider a hockey arena as the televised subject. The system has been set up for proper rendition of the ice as the highlight value. If the opposing teams now skate into the field of view, the large area of dark figures will now degrade the highlight tones of the ice and will, themselves, not be rendered as dark as the actual scene contrasts would require.

To understand the reasons for the effects described in the examples just discussed, we have chosen two types of subject material which, in the absence of the DC component, would produce the same video signal, and would cause confusion in the reproduced image.

Figure 142A shows the video signal from the camera amplifier which is caused by scanning a gray line on a black background. Since no DC component is present, the alternating current is averaged about the line X-X. Figure 142B shows the camera amplifier output when a white line across a gray background is scanned. The contrast between the line and the background is the same in each case and the AC video modulation produced would be the same. When the video signals in each of these cases are referred to the black level as shown in Figure 142C, the light values are then placed at their proper points on the scale, and no confusion exists. The direct current component caused by taking into account the average value of the background now differentiates the gray line on the black background and the white line on the gray background.

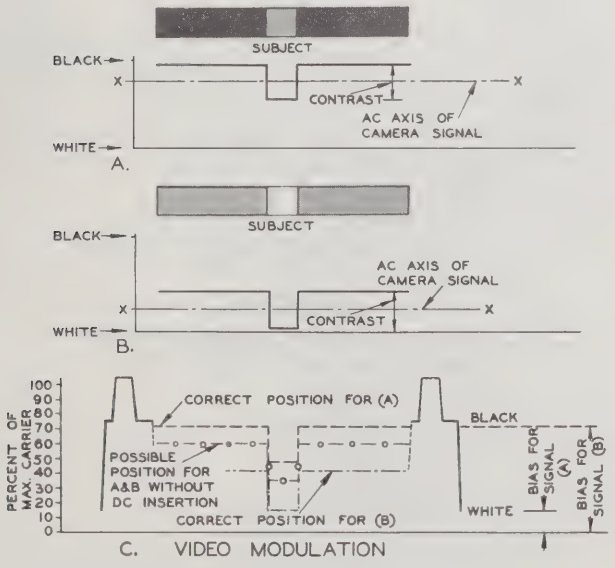


Fig. 142. Examples of Necessity for DC Component of Video Signal.

The proper value of DC bias can be produced at the transmitter in several ways:

1. It may be added directly to the modulation circuit by a manually operated control which is monitored by an observer who compares the image on a television screen, with the actual scene being televised and continually adjusts the background or average lighting.

2. An auxiliary camera operated in conjunction with the pickup camera utilizes a photoelectric cell to "integrate" the light of the scene and automatically provide a DC bias for establishing the background level.

3. Certain camera tubes, such as the Farnsworth image dissector, which are non-storage devices, employing a direct coupled output, can produce a direct current component, which is representative of the brightness of the scene. This type of tube is ideally suited to the television transmission of programs directly from motion picture films.

4. Orthicon types of camera tubes, as well as "flying-spot" scanners, can also be made to accomplish DC insertion automatically.

In all of these methods of inserting the DC component or bias level, the end result is the establishment of a fixed DC value for the "black" level of each frame.

In television transmitter practice, the DC component is often added to the video signal in the camera amplifiers, but is subsequently lost by passing the signal through higher level capacitance-coupled video amplifiers. The DC component is then re-inserted by rectifying the peak value of the video signal and adding the rectified DC voltage to the signal.

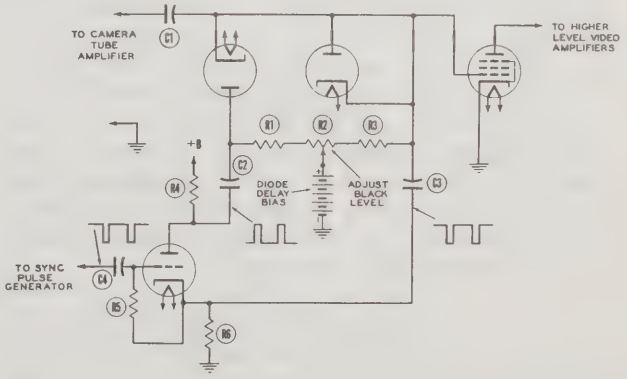


Fig. 143. Typical Double Diode "Clamp" Circuit, for Re-inserting DC at Transmitter

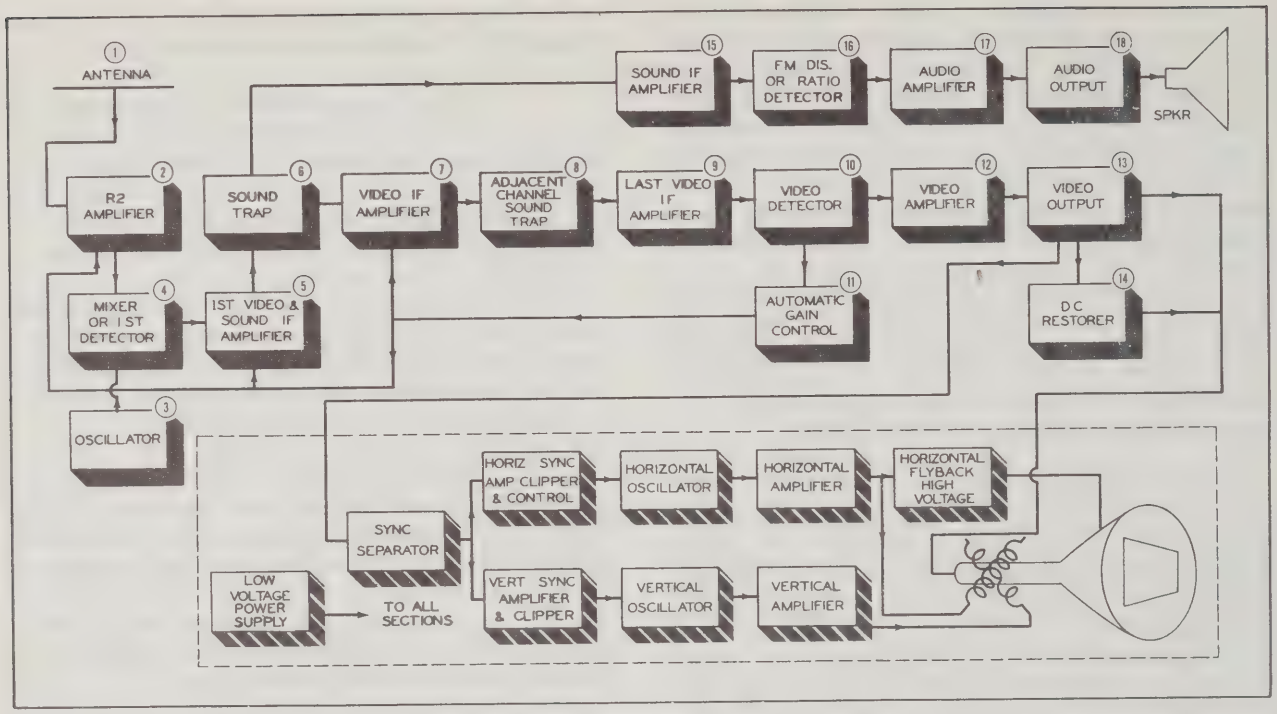


Fig. 144. Block Diagram of Complete Television Receiver. (Electromagnetic Deflection Type) Note: Portion of Receiver Enclosed in Dotted Lines Covered by Preceding Text. (See Fig. 134)

Figure 143 shows a typical transmitter DC re-insertion circuit. The circuit employs a double diode tube in a bridge network and is known as a "double diode clamp" circuit since it "clamps" the video signal at the black level. The sync pulses of the video signal establish the level at which this circuit operates. The DC furnished by the circuit for re-insertion is thus referred to a level previously established by the DC component inserted in the camera amplifier.

Figure 144 shows, in block diagram form, all the essential elements of the television receiver from the antenna to the picture tube for "sight" and to the loud speaker for "sound". Those portions of the circuit which are shown enclosed by the dotted line are the "slave circuits". These circuits include the power supply portions as well as those which control scanning and synchronization. Our study of the television receiver has also covered an explanation of the means for controlling the functions of these circuits.

We will now begin the study of the radio frequency amplifiers, intermediate frequency amplifiers (both video and audio) and the detectors which convert the television carrier wave into audio and video intelligence.

The block diagram of Figure 144 illustrates one particular type of television receiver. Another basic type, in which the sound is not separated from the signal until the combined signal reaches the video output stage (known as the "inter-carrier" sound system), will be covered when we consider video I-F amplification.

Consideration of the balance of the television receiver will be in the numerical order indicated in Figure 144, as follows:

1. The Television Antenna.
2. Radio Frequency Amplifier.
3. The Oscillator.
4. The Mixer or First Detector.
5. First Video and Sound I-F Amplifier.
6. Sound Trap.
7. Video I-F Amplifier.
8. Adjacent Channel Sound Trap.
9. Final Video I-F Amplifier.
10. Video Detector.
11. Automatic Gain Control.
12. Video Amplifier.
13. Video Output.
14. DC Restorer.
15. Sound I-F Amplifier.
16. FM Discriminator or Ratio Detector.
17. Audio Amplifier.
18. Audio Output.

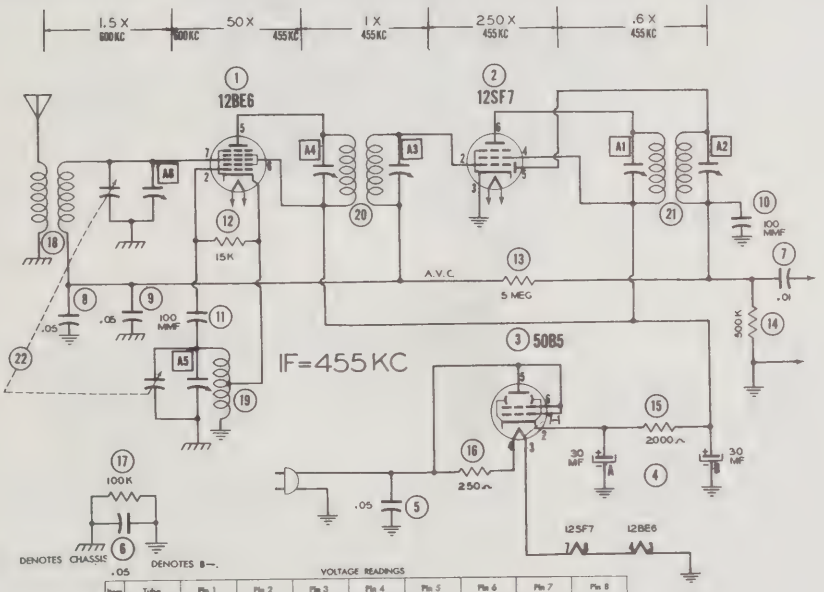
Installment 12 will begin the study of television antennae and R-F systems.

TRADE NAME	Adaptol, Model CT-1
MANUFACTURER	Adaptol Co., 120 New Lots Ave., Brooklyn, N.Y.
TYPE SET	AC-DC Operated AM Tuner with Self-Contained Power Supply
TUBES (THREE)	Types, 12BE6 Converter, 12SF7 IF-Det.-AVC, 50B5 Rectifier
POWER SUPPLY	110-120 Volts AC-DC
TUNING RANGE—BROADCAST	535-1680KC RATING .19 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

If a VTVM is not available a 20KΩ/volt DC voltmeter may be used as an output indicator. Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1	.1 MFD.	High side to rear stator of tuning cap. Low side to B-.	455KC	Tuning cap. fully open.	DC probe to Point (A). Common to B-.	A1,A2, A3,A4	Adjust for maximum deflection.
2	200MMFD	High side to ext. ant. lead. Low side to B-.	1680KC	"	"	A5	" " " "
3	200MMFD	"	1400KC	Tune for maximum output.	"	A6	" " " "



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12BE6	-6.6VDC§	0V.	0V.	13VAC	85VDC	85VDC	-.2VDC	-
2	12SF7	-.1VDC	-.2VDC	0V.	85VDC	-.2VDC	85VDC	27VAC	13VAC
3	50B5	117VAC	130VDC	27VAC	70VAC	117VAC	117VAC	117VAC	-

§TAKEN WITH VACUUM TUBE VOLTMETER

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12BE6	15KΩ	.5Ω	0Ω	13Ω	32KΩ	32KΩ	5 Meg.	-
2	12SF7	100KΩ	5 Meg.	0Ω	32KΩ	500KΩ	32KΩ	27Ω	13Ω
3	50B5	350Ω	30KΩ	27Ω	80Ω	350Ω	350Ω	350Ω	-

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

4818-1

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - No signal applied for voltage measurements.

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: ADAPTOL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	12BE6	12BE6	7CH	
2	IF-Det.-AVC	12SF7	12SF7	7AZ	
3	Rectifier	50B5	50B5	7BZ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: ADAPTOL PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
4A	30	150		PRSA150/30-30	EZ3315	DSB-2x30-150	TA-330	Filter-Red
B	30	150						" "
5	.05	600		684-05	DT6S5	ST-6-05	TC-15	Line Filter
6	.05	150		484-05	DT2S5	ST-4-05	72P1	Line Isolation
7	.01	500		684-01	DT6S1	ST-4-01	TC-11	Audio Coupling
8	.05	150		484-05	DT2S5	ST-4-05	TC-15	AVC Filter
9	.05	150		484-05	DT2S5	ST-4-05	TC-15	RF Bypass
10	100	500		1468-0001	5W5T1	MO.5-31	1FM-31	Diode RF Filter
11	100	500		1468-0001	5W5T1	MO.5-31	1FM-31	Osc. Grid Cap.

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ADAPTOL PART No.	IRC PART No.	IDENTIFICATION CODES
12	15KΩ	½		BTS-15K	Br.-Grn.-Or. Osc. Grid
13	5 Meg.	½		BTS-4.7 Meg.	Grn.-Blk.-Grn. AVC Network
14	500KΩ	½		BTS-470K	Grn.-Blk.-Yl. Diode Load
15	2000Ω	2		BT-2-2000	Red-Blk.-Red Filter
16	250Ω	10		AB-250	Line Dropping
17	100KΩ	½		BTS-100K	Br.-Blk.-Yl. Line Isolation

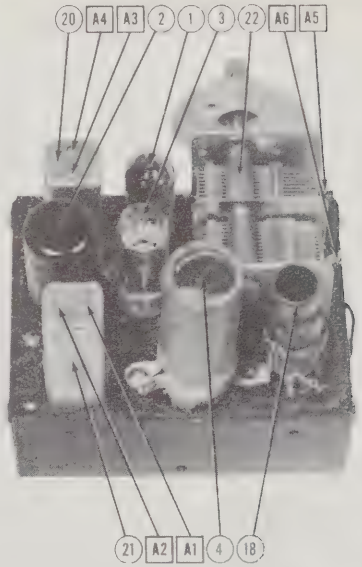
R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: ADAPTOL PART No.	REPLACEMENT DATA: MEISSNER PART No.	
18	Ant. Coil	34Ω	3.5Ω		14-1056	
19	Osc. Coil		3.6Ω		14-1060	
20	Input IF	9.6Ω	10Ω		16-6678	
21	Output IF	9.5Ω	10Ω		16-6675	

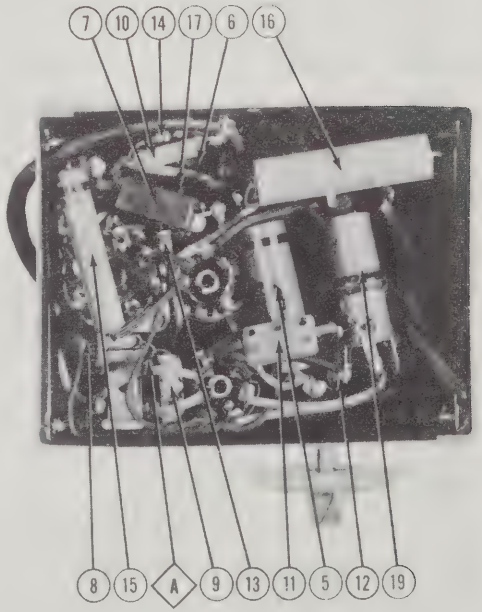
MISCELLANEOUS

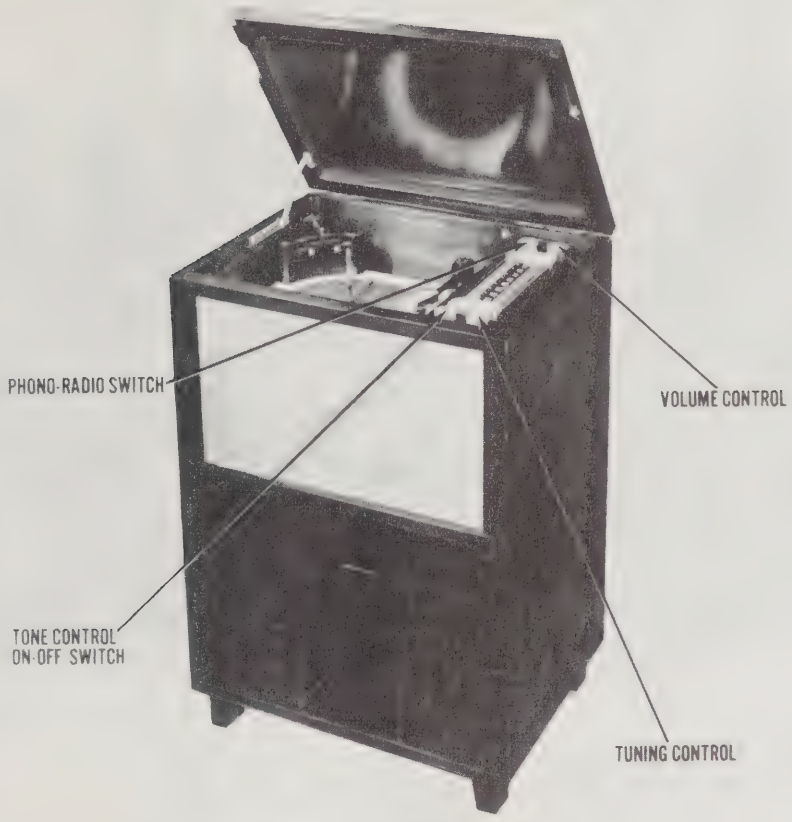
ITEM No.	PART NAME	ADAPTOL PART No.	NOTES
22	2 Gang Var. Cap.		(37-4.9MMF, 21-1.2MMF)

CHASSIS—TOP VIEW



CHASSIS—BOTTOM VIEW





ADMIRAL MODEL 7C60M

TRADE NAME	Admiral, Models 7C60B, 7C60M, 7C60W (Ch. 6B1)
MANUFACTURER	Admiral Corp., 3800 W. Cortland St., Chicago, Ill.
TYPE SET	AC Operated Combination Phono-Radio Superheterodyne Receiver with Loop Antenna
TUBES (SIX)	Types, 12SA7 Converter, 12SK7GT IF Amp., 12SQ7 Det.-AVC, 12SJ7GT AF Amp., 35L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	110-120 Volts AC
TUNING RANGE—BROADCAST	540-1630KC RATING .23 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set left edge of pointer saddle over the 1/16" hole at extreme left end of dial backplate.

Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	250MMFD	High side to rear stator of tuning cap. Low side to B-.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output.
2	250MMFD	"	1630KC	"	"	A5	Adjust for maximum output. Install receiver in cabinet.
3		Loop	1400KC	Tune for maximum output.	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

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PARTS LIST AND DESCRIPTIONS

ADMIRAL CHASSIS 6B1

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: ADMIRAL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	12SA7	12SA7	8R	
2	IF Amp.	12SK7GT	12SK7GT	8N	
3	Det.-AVC	12SQ7	12SQ7	8Q	
4	AF Amp.	12SJ7GT	12SJ7GT	8N	
5	Power Output	35L6GT	35L6GT	7AC	
6	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: ADMIRAL PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
7A	30	150	67A14-1	PRSA40302	EZ422150	DSB-403020-150	TA-330	Filter-Yellow
B	30	150						" -Red
C	20	150		PRS150/20		M-25-25	TA-220	" -Blue
D	20	25						Cathode By.-Green
8	.05	400	64B1-22	484-05	DT4S5	ST-4-05	TC-15	Line Filter
9	.18	200	64A2-2	484-.2	DT4P2	ST-4-2	TC-2	Line Isolation
10	.03	400	64B1-23	484-03	DT4S3	ST-6-03	TC-13	Output Plate Bypass
11	.01	400	64B1-25	484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
12	.01	400	64B1-25	484-01	DT4S1	ST-4-01	TC-11	" "
13	.05	400	64B1-22	484-05	DT4S5	ST-4-05	TC-15	AF Screen Bypass
14	.1	200	64B1-30	484-.1	DT2P1	ST-4-1	TC-1	AF Plate Decoup.
15	.001	600	64B1-15	684-001	DT6D1	ST-6-001	TC-21	Audio Coupling
16	.25	200		484-.25	DT2P25	ST-2-25	TC-2	Phono Bias Filter
17	.05	400	64B1-22	484-05	DT4S5	ST-4-05	TC-15	Phono Isolation
18	.1	200	64B1-30	484-.1	DT2P1	ST-2-1	TC-1	AVC Filter
19	.005	600	64B1-12	684-005	DT6D5	ST-6-005	TC-25	Ext. Ant. Coup.-Note 1
20	.05	400	64B1-22	484-05	DT4S5	ST-4-05	TC-15	Decoupling
21	.01	400	64B1-25	484-01	DT4S1	ST-4-01	TC-11	Tone Comp.
22	.002	600	64B1-14	684-002	DT6D2	ST-6-002	TC-22	" "
23	15	300	65B6-18				MS-415	AF Plate Byp.-Cer.-Note 1
24	250	300	65B6-5	1468-00025	5W5T25	MO.5-325	1FM-325	Diode Filter-Cer.
25	50	300	65B6-4	1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap.-Cer.
26	15	300	65B6-18				MS-415	Fixed Trimmer-Cer.
27	500	300	65B6-6	1468-0005	5W5T5	MO.5-35	1FM-35	Tone Comp.-Cer.
28	.02	400	64B1-24	484-02	DT4S2	ST-4-02	TC-12	Tuning Cap.Iso.-Note 2

Note 1-Not used in all models.
Note 2-Used in underwriters approved models only.

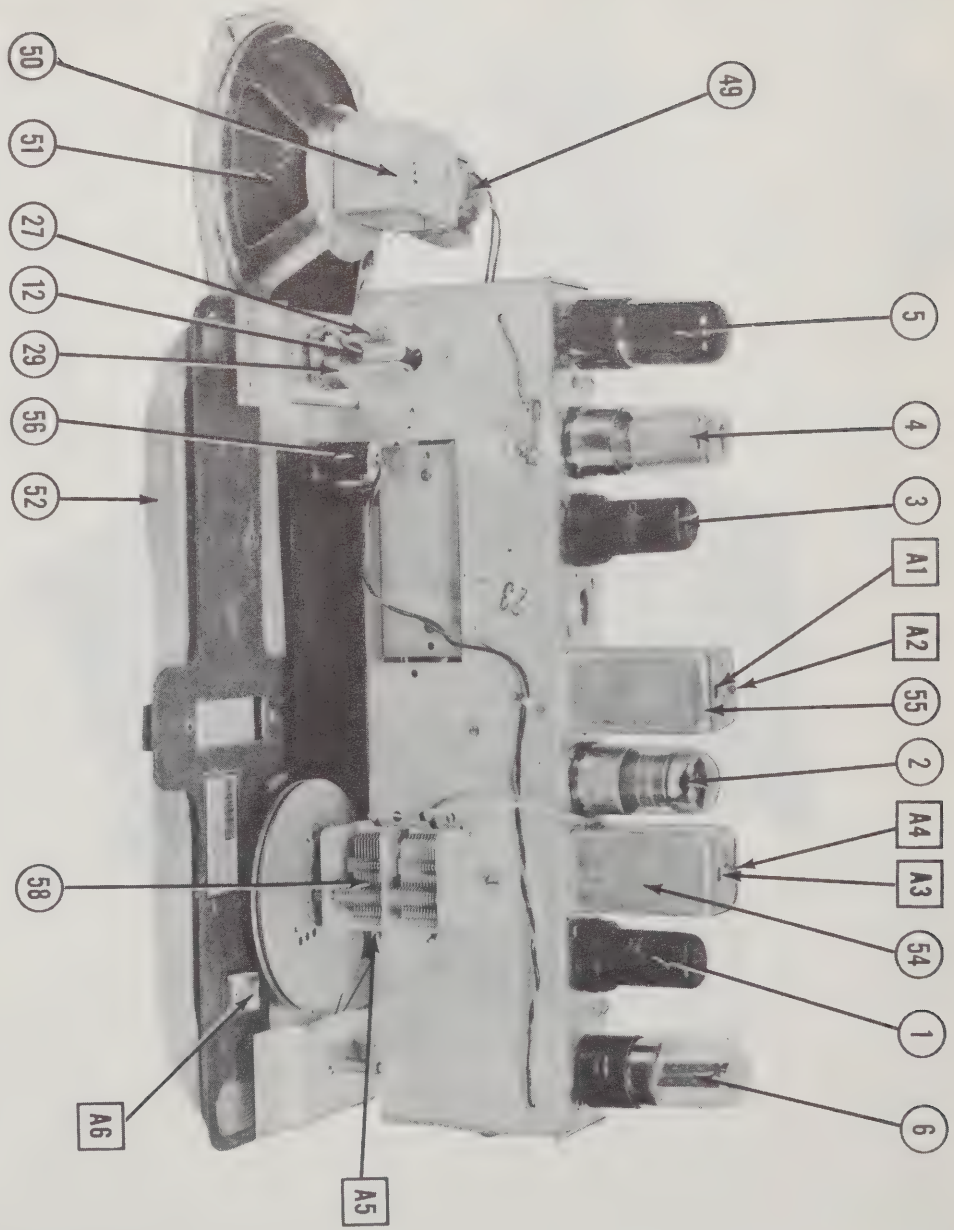
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ADMIRAL PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
29A	1 Meg.	½	75B2-6	D19-137X	AT-112	Volume Control
B	Shaft		Not Req.	E	KSS-3	Attach to 29A per instructions
30A	2 Meg.	½	75B1-12	D13-139	AM-83-3	Tone Control
B	Shaft		Not Req.	E	KSS-3	Attach to 30A per instructions
C	Switch		" "	41	SW-A	" " " " "

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ADMIRAL PART No.	IRC PART No.	IDENTIFICATION CODES
31	22KΩ	½	60B8-223	BTS-22K	Red-Red-Or. Osc. Grid
32	10 Meg.	½	60B8-106	BTS-10 Meg.	Br.-Blk.-Blue Osc. Grid
33	1 Meg.	½	60B8-105	BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
34	100KΩ	½	60B8-104	BTS-100K	Br.-Blk.-Yl. Diode Filter
35	27KΩ	½	60B8-273	BTS-27K	Red-Vi.-Or. Tone Comp.
36	100Ω	½	60B8-101	BW-½-100	Br.-Blk.-Br. Decoupling
37	4.7 Meg.	½	60B8-475	BTS-4.7 Meg.	Yl.-Vi.-Grn. AF Grid
38	1.8 Meg.	½	60B8-185	BTS-1.8 Meg.	Br.-Gray-Grn. AF Screen
39	100KΩ	½	60B8-104	BTS-100K	Br.-Blk.-Yl. AF Plate Load
40	47KΩ	½	60B8-473	BTS-47K	Yl.-Vi.-Or. AF Plate Decoup.
41	470KΩ	½	60B8-474	BTS-470K	Yl.-Vi.-Yl. Output Grid
42	150Ω	1	60B14-151	BW-1-150	Br.-Grn.-Br. Output Cathode
43	1000Ω	1	60B28-2	BTA-1000	Br.-Blk.-Red Filter

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	ADMIRAL PART No.	IRC PART No.	
44	220Ω	1	60B23-7	BW-1-220	Red-Red-Br. Filter
45	33Ω	1	60B2s-3	BW-1-33	Or.-Or.-Blk. Surge Limiter
46	150KΩ	½	60B8-154	BTS-150K	Br.-Grn.-Yl. Line Isolation
47	22KΩ	½	60B8-223	BTS-22K	Red-Red-Or. Voltage Dropping
48	33KΩ	½	60B8-333	BTS-33K	Or.-Or.-Or. Phono Bias Network-See Note

Note-Not used in all models.

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		ADMIRAL PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
49	1800Ω	2.3Ω	260Ω	.4Ω	98A33-10	A-3876†	T22S45†	A-2928†	†Bend mounting tabs down, file out slots and mount on original bracket.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			ADMIRAL PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.		ST-108		
50	PM	2.8Ω	78B31-2	Mod. P6-X	6A15	
	CONE DIA.	VC DIA.				
51	5-7/8"	9/16"				

R F COILS

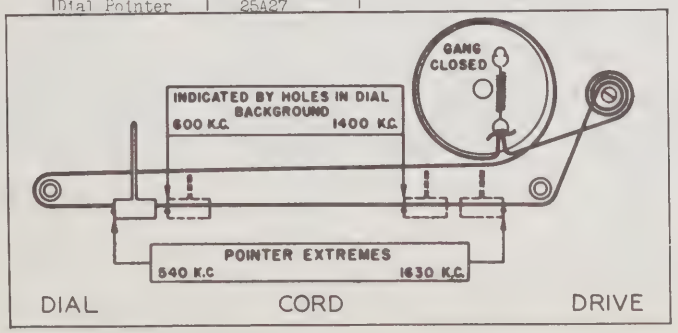
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	ADMIRAL PART No.	MEISSNER PART No.	
52	Loop Ant.		2Ω	69B13		Some models use loop with primary winding.
53	Osc. Coil		5.6Ω	69A14	14-1060	
54	Input IF	18Ω	18Ω	72B3	16-6658	
55	Output IF	21Ω	22Ω	72B4	16-6660	

DIAL LIGHT

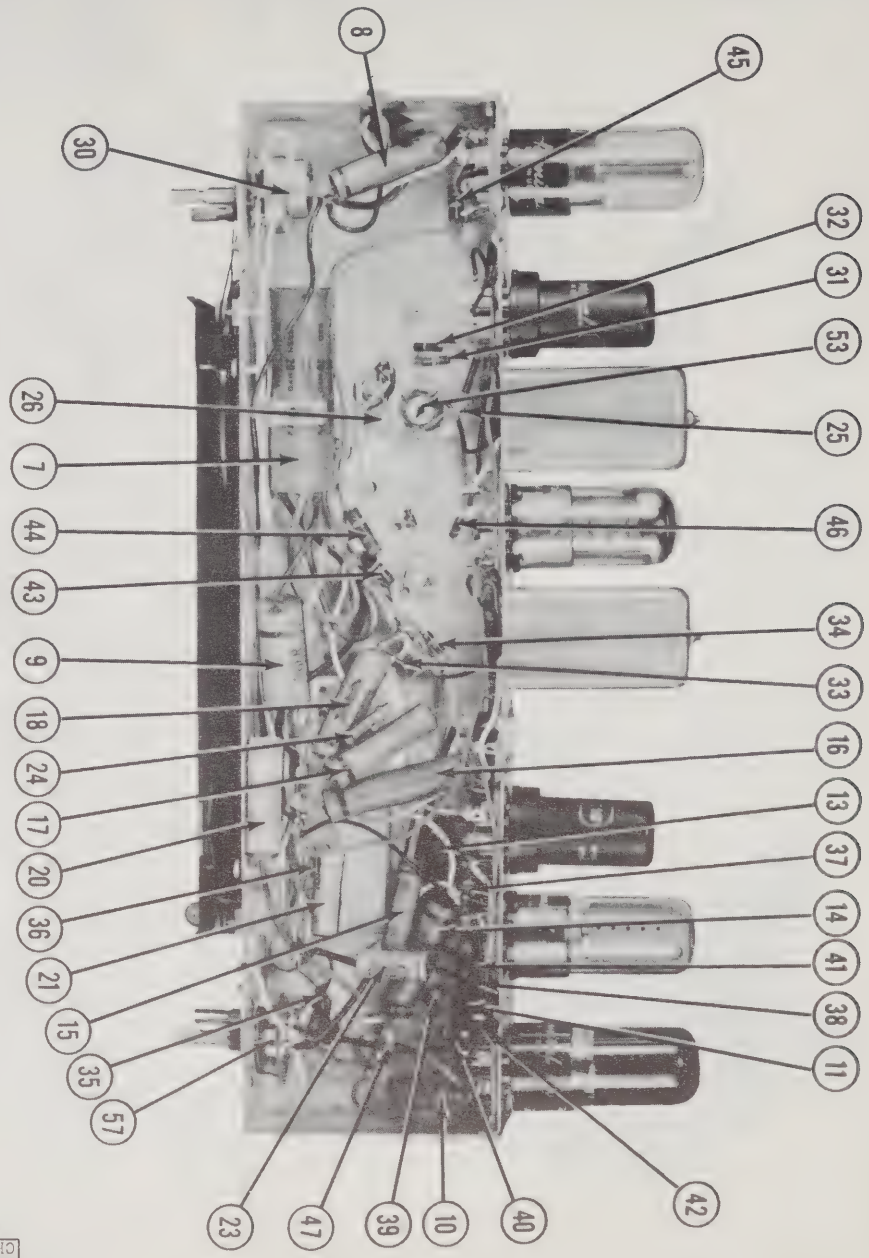
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					ADMIRAL PART No.		
56	Bayonet	6-8	0.15	Brown			Type 47

MISCELLANEOUS

ITEM No.	PART NAME	ADMIRAL PART No.	NOTES
57	Switch	77A16-1	Radio-Phono
58	2 Gang Var. Cap.	A1341	(20-427MMF, 17-176 MMF)
	Dial Scale	21B48-1	Glass
	Knob	33A19-6	
	Dial Pointer	25A27	

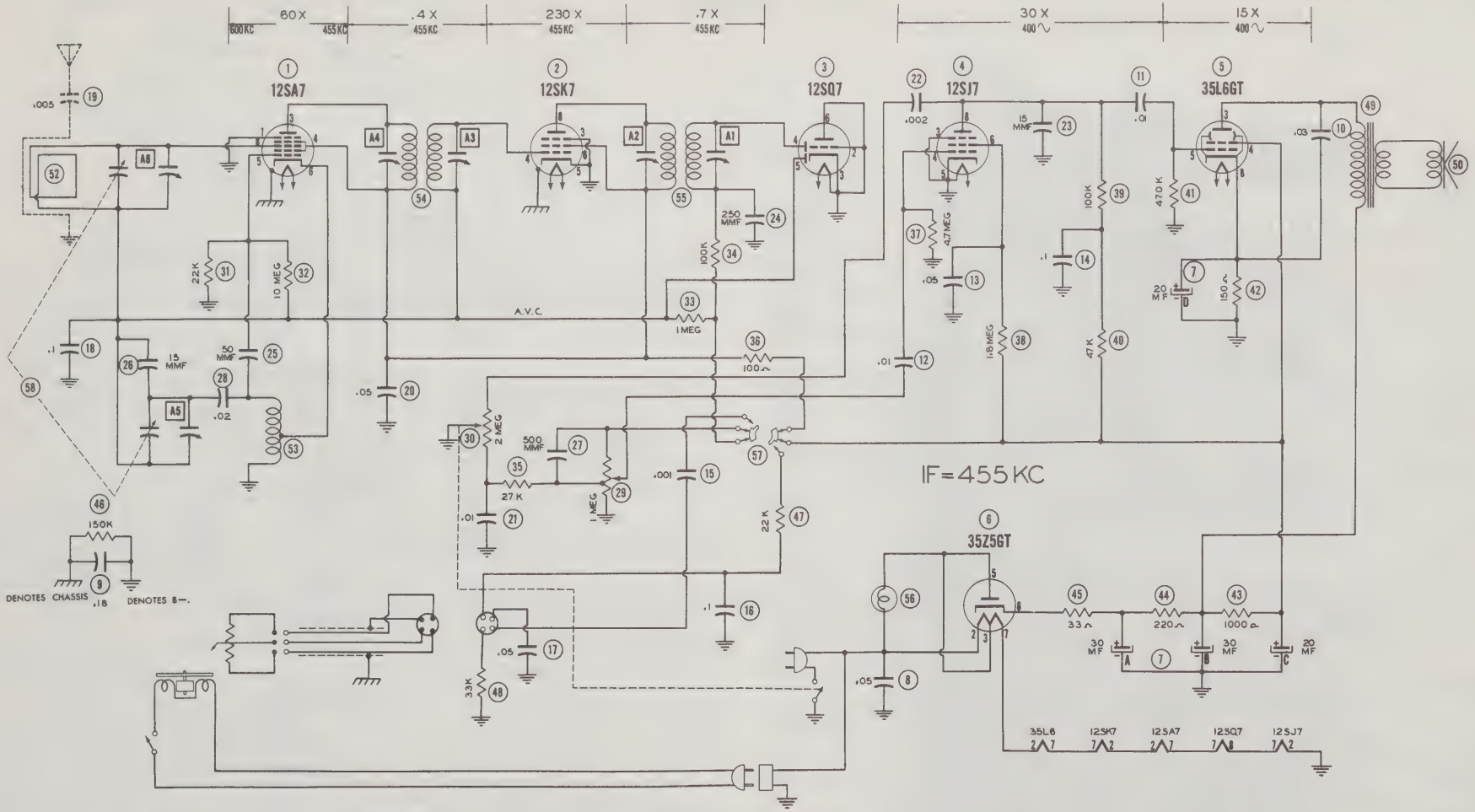


CHASSIS—BOTTOM VIEW



ADMIRAL CHASSIS 6B1

DATE 10/48-#4818-2 SET #48-FOLDER #2



VOLTAGE READINGS

RADIO-PHONO SWITCH IN RADIO POSITION.

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7	0V.	36VAC	75VDC	75VDC	-5.4VDC§	0V.	23VAC	-.2VDC
2	12SK7GT	0V.	36VAC	0V.	-.2VDC	0V.	75VDC	50VAC	75VDC
3	12SQ7	0V.	0V.	0V.	-.1VDC	-.2VDC	0V.	12VAC	23VAC
4	12SJ7GT	0V.	0V.	0V.	-.2VDC	0V.	12VDC	12VAC	55VDC
5	35L6GT	0V.	80VAC	90VDC	75VDC	0V.	0V.	50VAC	4.8VDC
6	35Z5GT	0V.	117VAC	112VAC	0V.	112VAC	115VDC	80VAC	115VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7	INF.	42Ω	70KΩ	70KΩ	22KΩ	1Ω	28Ω	2 Meg.
2	12SK7GT	150KΩ	42Ω	0Ω	2 Meg.	0Ω	70KΩ	56Ω	70KΩ
3	12SQ7	INF.	0Ω	0Ω	850KΩ	2 Meg.	0Ω	14Ω	28Ω
4	12SJ7GT	INF.	0Ω	0Ω	4.7 Meg.	0Ω	1.8 Meg.	14Ω	220KΩ
5	35L6GT	INF.	90Ω	70KΩ	70KΩ	470KΩ	INF.	56Ω	150Ω
6	35Z5GT	INF.	120Ω	118Ω	INF.	118Ω	70KΩ	90Ω	70KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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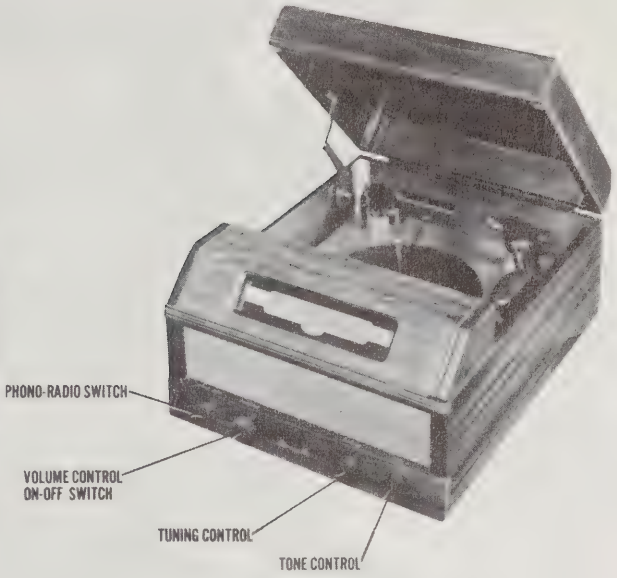
4818-2

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

AIRCASTLE MODELS
G-516, G-518



AIRCASTLE MODELS
G-516, G-518

TRADE NAME	Aircastle, Models G-516, G-518
SUPPLIER	Spiegel Inc., 1061 W. 35th St., Chicago, Ill.
TYPE SET	AC Operated Combination Phono Radio Superhet. Receiver-Self Contained Loop Ant.
TUBES (FIVE)	Types, 12SA7GT Converter, 12SK7GT IF Amp., 12SQ7GT Det.-AVC-AF, 50L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	110-120 Volts AC
TUNING RANGE—BROADCAST	532-1700KC RATING .230 Amps. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer if available. If not, connect a .1 MFD capacitor in series with low side of signal generator and chassis. Loop should be maintained in same relative position to chassis as when receiver is in cabinet. Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.01 MFD.	High side to rear stator of tuning cap. Low side to chassis.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If isolation transformer is not used, reduce dummy ant. to .001 MFD. to reduce hum modulation.
2		Loop	1700KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	1550KC	Tune for maximum output.	"	A6	Adjust for maximum output.

DISASSEMBLY INSTRUCTIONS

1. Remove two screws from bottom of cabinet holding record changer in cabinet.
2. Remove phono-pickup plug from chassis.
3. Remove phono-motor plug from chassis.
4. Remove record changer from cabinet.
5. Remove four push-on type control knobs.
6. Remove two Phillips head wood screws holding panel in back of chassis. Remove panel from cabinet.
7. Remove three screws holding chassis in cabinet. Remove staples holding loop in cabinet. Remove chassis and loop from cabinet.

HOWARD W. SAMS & CO., INC. **Indianapolis Indiana**

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DATE 10/48-#4818-3 SET #48-FOLDER #3

PARTS LIST AND DESCRIPTIONS

AIRCASTLE MODELS
G-816, G-818

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: AIRCASTLE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	12SA7GT	12SA7GT	8AD	
2	IF Amp.	12SK7GT	12SK7GT	8N	
3	Det.-AVC-AF	12SQ7GT	12SQ7GT	8Q	
4	Power Output	50L6GT	50L6GT	7AC	
5	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: AIRCASTLE PART No.	SOLAR PART No.	SPRAGUE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	80	150		DY-804020-150	TEL-340*	AF88D4*		■ Filter
B	40	150				PRS-150-40	UP84215	▲ "
C	20	150			UT-201			Output Cathode Bypass
7	.01	600		ST-6-01	TC-11	684-01	DT6S1	Output Plate Bypass
8	.005	600		ST-6-005	TC-25	684-005	DT6D5	Audio Coupling
9	.005	600		ST-6-005	TC-25	684-005	DT6D5	Tone Compensation
10	.003	600		ST-6-003	TC-23	684-003	DT6D3	" "
11	.005	600		ST-6-005	TC-25	684-005	DT6D5	Audio Coupling
12	.1	400		ST-4-1	TC-1	484-.1	DT4P1	AVC Filter
13	.05	400		ST-4-05	TC-15	484-05	DT4S5	IF Cathode Bypass
14	.01	600		ST-6-01	TC-11	684-01	DT6S1	RF Bypass Power Supply
15	.1	400		ST-4-01	TC-1	484-.1	DT4P1	Phono Isolation
16	.1	600		MPH-6-1	TC-1	684-.1	DT6P1	Line Filter
17	.01	600		ST-6-01	TC-11	684-01	DT6S1	Ext. Ant. Isolation
18	100	500		MO.5-31	1FM-35	1468-0001	5W5T1	AF Plate Bypass
19	100	500		MO.5-31	1FM-35	1468-0001	5W5T1	Osc. Grid Cap.
20	10	500		MO.5-41	MS-41	1468-00001	5W5Q1	Fixed Trimmer-See Note1

*Parallel sections to obtain desired capacity.
Note 1-Not used in all models.

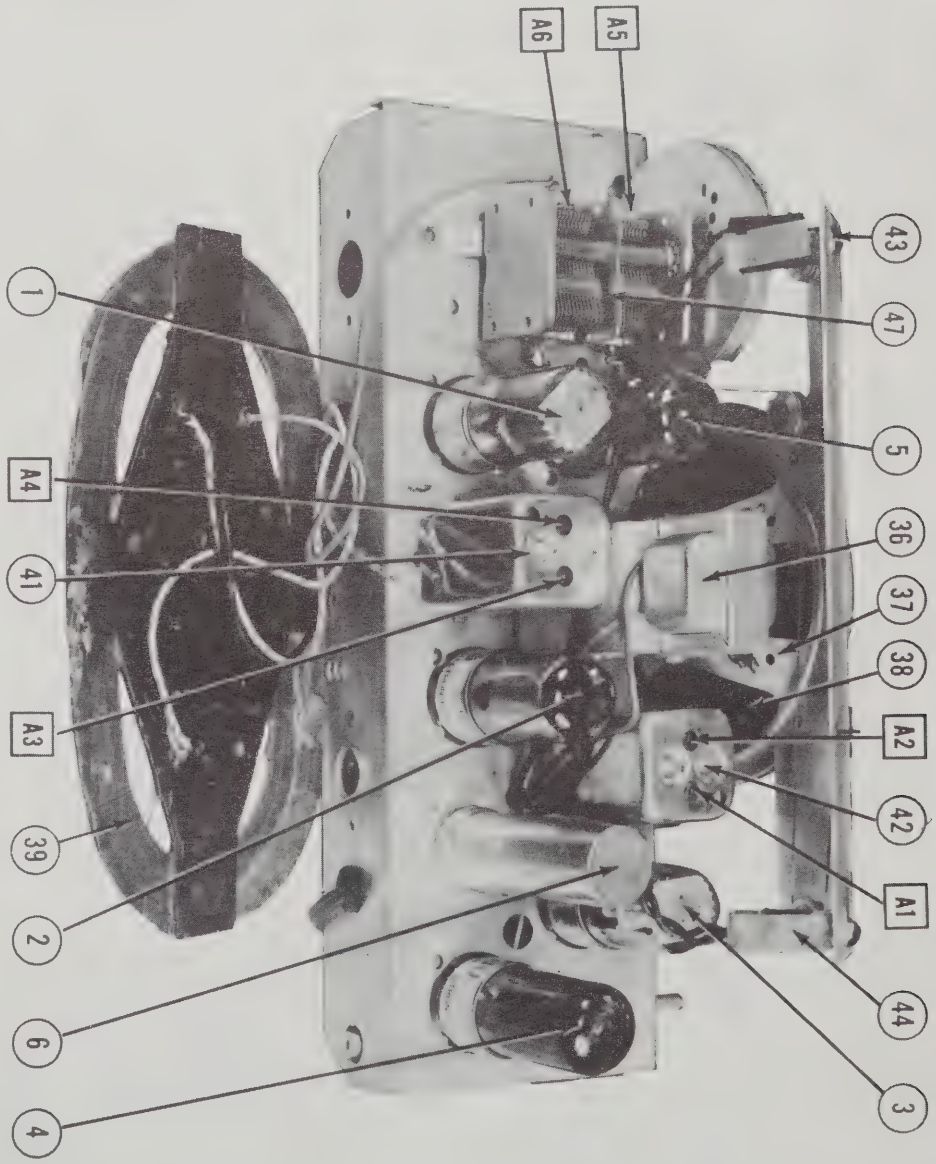
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIRCASTLE PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
21A	500KΩ	½	RP5-2A	D13-133X	AT-92	Volume Control & SW.
B	Shaft		Not Req.	E	KSS-3	Attach to 21A per instructions
C	Switch		" "	41	SW-A	" " " " "
22A	500KΩ	½	RP6-504B	D13-133	AM-60-Z	Tone Control
B	Shaft		Not Req.	E	KSS-3	Attach to 22A per instructions

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIRCASTLE PART No.	IRC PART No.	IDENTIFICATION CODES
23	22KΩ	½		BTS-22K	Red-Red-Or. Oscillator Grid
24	2.2 Meg.	½		BTS-2.2 Meg.	Red-Red-Grn. AVC Network
25	3.9 Meg.	½		BTS-3.9 Meg.	Or.-White-Grn. AF Grid
26	33KΩ	½		BTS-33KΩ	Or.-Or.-Or. Tone Compensation
27	330KΩ	½		BTS-330K	Or.-Or.-Yl. AF Plate Load
28	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. Output Grid
29	47Ω	½		BW-½-47	Yl.-Vi.-Blk. Output Cathode
30	100Ω	½		BW-½-100	Br.-Blk.-Br. Output Cathode
31	1000Ω	1		BTA-1000	Br.-Blk.-Red Filter
32	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. Phono Shunt
33	820KΩ	½		BTS-820K	Gray- Red-Yl. Series Phono
34	100Ω	½		BW-½-100	Br.-Blk.-Br. Surge Limiter
35	150Ω	½		BW-½-150	Br.-Grn.-Br. Pilot Light Shunt

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		AIRCASTLE PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
36	2100Ω	3.3Ω	150Ω	.55Ω	Part of EH-19	A-3876†	T22S45†	A-2928†	†Bend mounting tabs down, file out slots and mount on original bracket.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			AIRCASTLE PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.		ST-105	5A07	
37	PM	3.3Ω	EH-19	Mod. P5-X		
	CONE DIA.	VC DIA.				
38	4-3/4"	9/16"				

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	AIRCASTLE PART No.	MEISSNER PART No.	
39	Loop Ant.	.2Ω	1.5Ω	LL7		
40	Osc. Coil		6.8Ω	LO2	14-1040	
41	Input IF	16Ω	16Ω	TM2-10	16-6658	
42	Output IF	16Ω		TM2-11	16-6670	

DIAL LIGHT

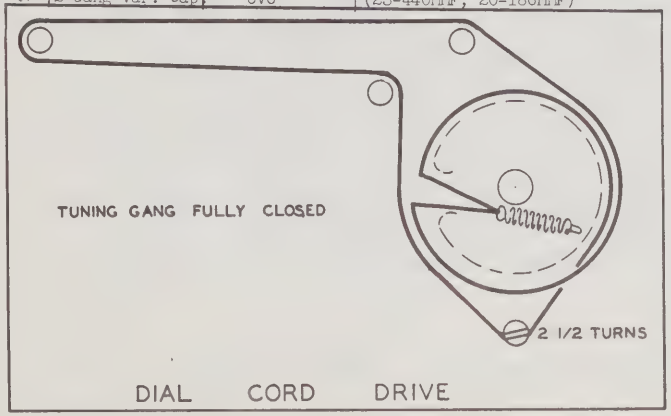
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					AIRCASTLE PART No.		
43	Bayonet	2.9	.17	White			Type 291
44	"	"	"	"			"

PHONO CARTRIDGE

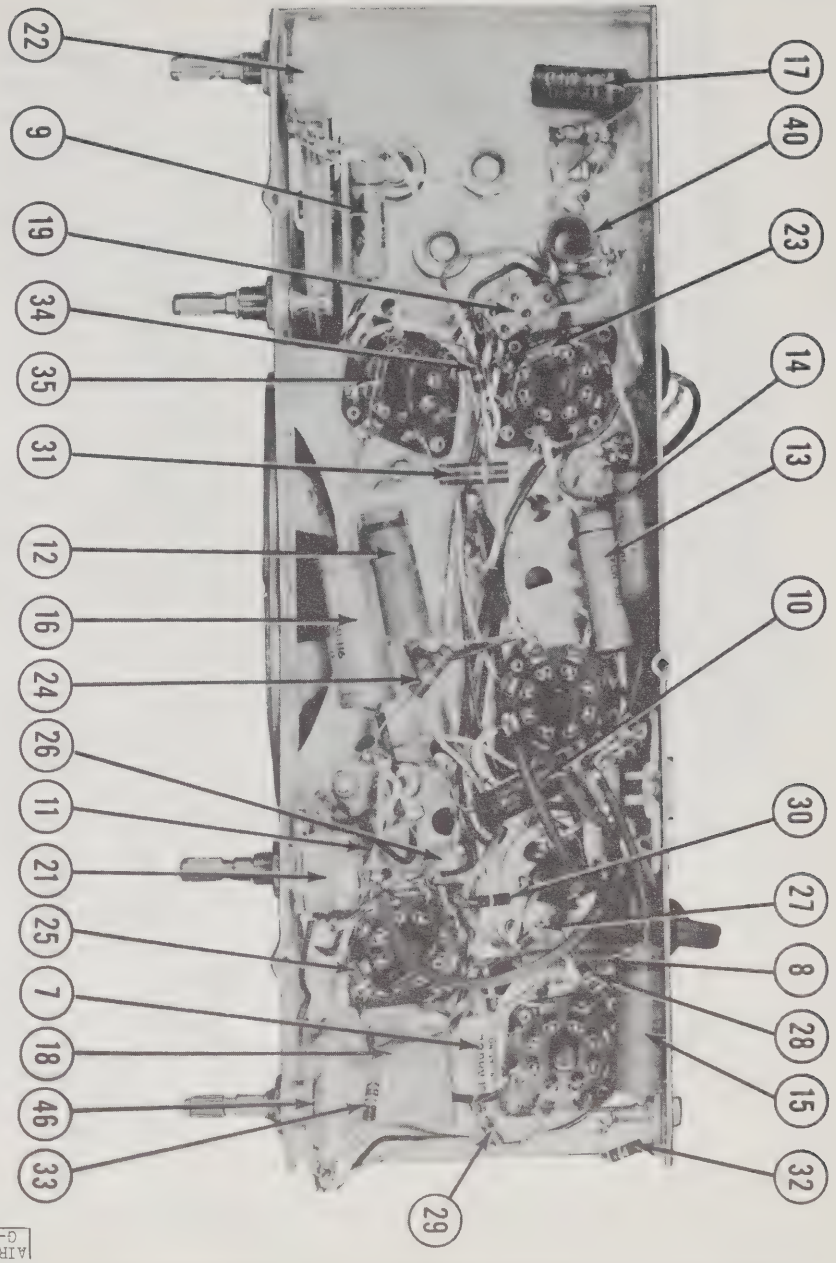
ITEM No.	REPLACEMENT DATA		REMARKS
	AIRCASTLE PART No.	ASTATIC PART No.	
45		L-70A	L-70-AZ Original Part

MISCELLANEOUS

ITEM No.	PART NAME	AIRCASTLE PART No.	NOTES
46	Switch	SR13	Radio-Phono
47	2 Gang Var. Cap.	CV6	(23-440MMF, 20-186MMF)

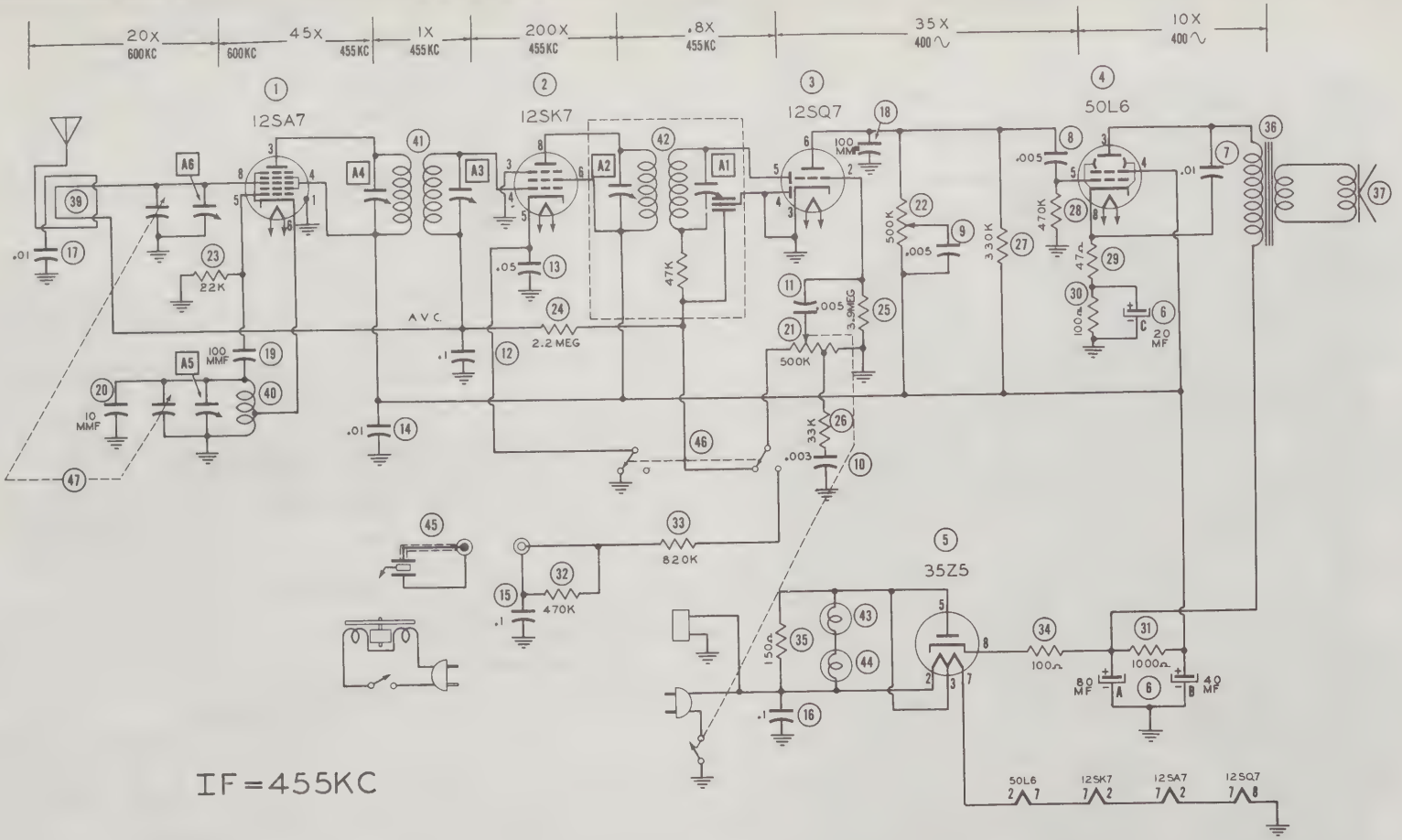


CHASSIS—BOTTOM VIEW



AIRCASTLE MODELS G-516, G-518

AIRCASTLE MODELS G-516, G-518



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VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7GT	0V.	12VAC	75VDC	75VDC	-7.6VDC§	0V.	25VAC	-.6VDC
2	12SK7GT	0V.	25VAC	-.6VDC	-.6VDC	0V.	75VDC	38VAC	75VDC
3	12SQ7GT	0V.	-1VDC	0V.	0V.	-.5VDC	55VDC	12VAC	0V.
4	50L6GT	3VDC	85VAC	90VDC	75VDC	0V.	0V.	38VAC	4.4VDC
5	35Z5GT	100VDC	117VAC	113VAC	75VDC	113VAC	100VDC	85VAC	105VDC

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7GT	0Ω	13Ω	30KΩ	30KΩ	22KΩ	.7Ω	27Ω	3 Meg.
2	12SK7GT	0Ω	27Ω	3 Meg.	3 Meg.	0Ω	30KΩ	40Ω	30KΩ
3	12SQ7GT	0Ω	4 Meg.	0Ω	0Ω	560KΩ	360KΩ	13Ω	0Ω
4	50L6GT	100Ω	90Ω	30KΩ	30KΩ	500KΩ	INF.	40Ω	140Ω
5	35Z5GT	30KΩ	120Ω	115Ω	30KΩ	115Ω	30KΩ	90Ω	30KΩ

§TAKEN WITH VACUUM TUBE VOLTMETER.

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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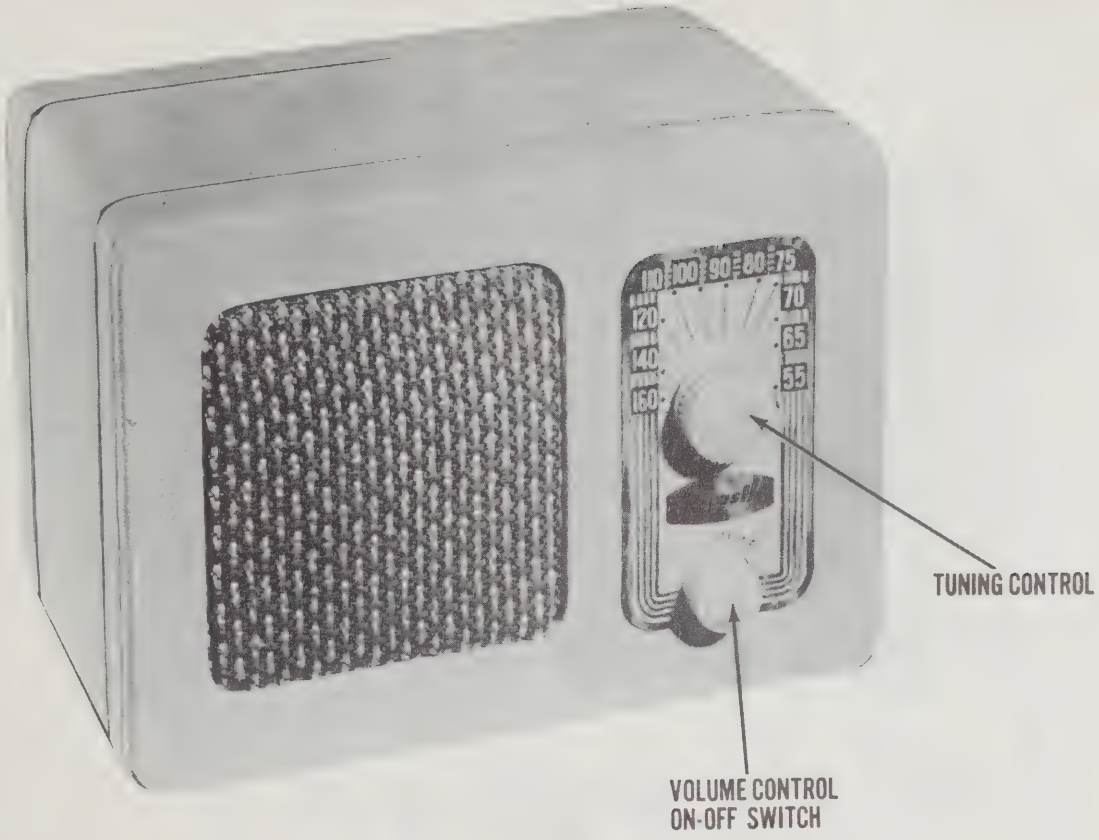
4818-3

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. **DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.**
2. **Socket connections are shown as bottom views.**
3. **Measured values are from socket pin to common negative.**
4. **Line voltage maintained at 117 volts for voltage readings.**
5. **Nominal tolerance on component values makes possible a variation of + 10% in voltage and resistance readings.**
6. **Volume control at maximum, no signal applied for voltage measurements.**

AIRCASTLE
MODEL 5050



AIRCASTLE
MODEL 5050

AIRCASTLE MODEL 5050

TRADE NAME	Aircastle, Model 5050
SUPPLIER	Spiegel Inc., 1061 W. 35th St., Chicago, Ill.
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types, 12BE6 Converter, 12BA6 IF Amp., 12AT6 Det.-AVC-AF, 50B5 Power Output, 35W4 Rectifier.
POWER SUPPLY	110-125 Volts AC-DC
TUNING RANGE—BROADCAST	540-1650KC RATING .23 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.
Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to rear stator of tuning cap. Low side to B-.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD to reduce hum modulation.
2	.1 MFD.	"	1650KC	"	"	A5	Adjust for maximum output. Re-assemble receiver in the cabinet.
3		Loop	1400KC	Tune for maximum volume.		A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum volume.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: AIRCASTLE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	12BE6	12BE6	7CH	
2	IF Amp.	12BA6	12BA6	7BK	
3	Det.-AVC-AF	12AT6	12AT6	7BT	
4	Power Output	50B5	50B5	7BZ	
5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: AIRCASTLE PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	40	150	EC-12	PRSA150/40-20	EDL4215	DSB-3x20-150*	TA-240	Filter-Yellow
B	20	150						" -Red
7	.1	400	PC8	484-.1	DT4P1	ST-4-1	TC-1	Line Filter
8	.1	400	PC8	484-.1	DT4P1	ST-4-1	72P2	Line Isolation
9	.01	400	PC7	484-01	DT4S1	ST-4-01	TC-11	Output Plate Bypass
10	.005	600	PC6	684-005	DT6D5	ST-6-005	TC-25	Audio Coupling
11	.005	600	PC6	684-005	DT6D5	ST-6-005	TC-25	" "
12	.05	400	PC5	484-05	DT4S5	ST-4-05	TC-15	AVC Filter
13	250	500		1468-00025	5W5T25	MO.5-325	1FM-325	AF Plate Bypass
14	100	300	MC2	1468-0001	5W5T1	MO.5-31	1FM-31	Diode RF Filter-Cer.
15	47	500		1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap.

*Parallel sections to obtain desired capacity.

CONTROLS

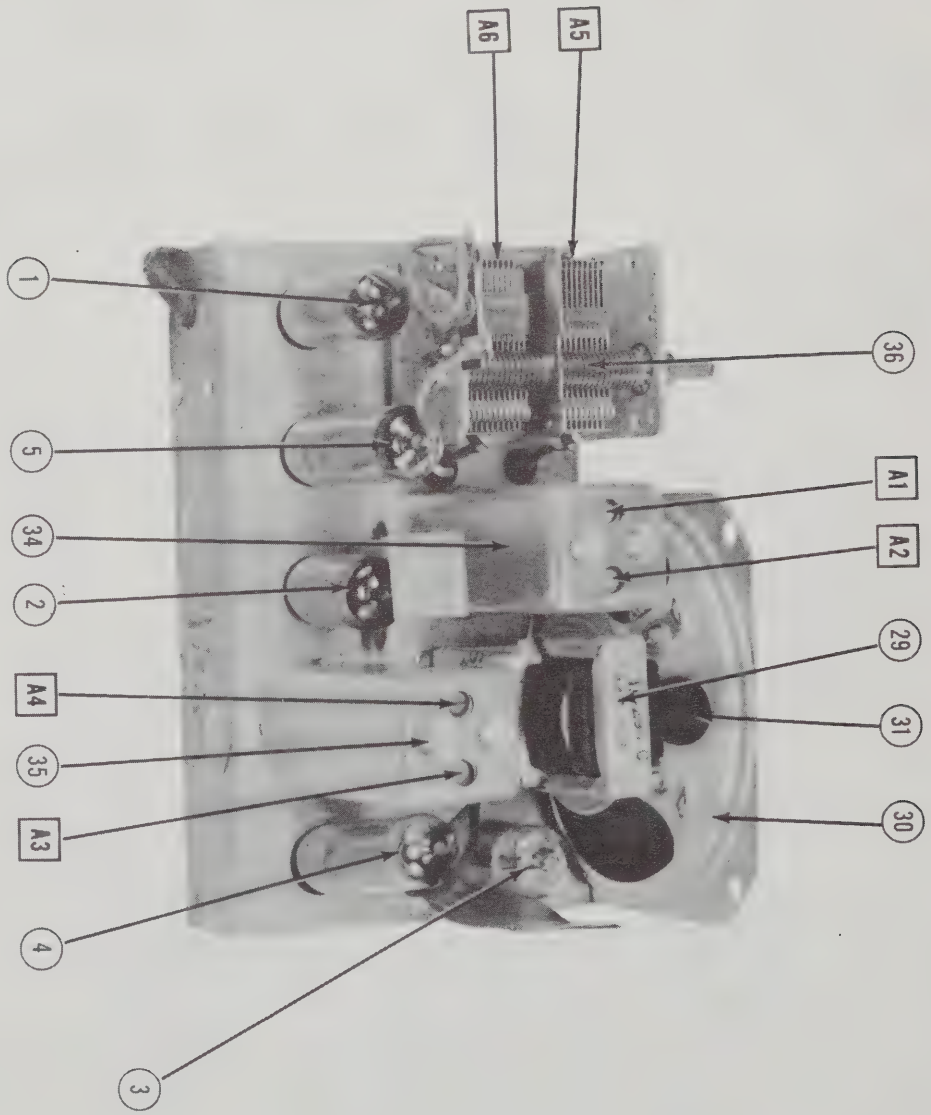
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIRCASTLE PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
16A	1 Meg.	½	VC-9	D13-137	AM-63-Z	Volume Control
B	Shaft		Not Req.	E	KSS-3	Attach to 16A per instructions
C	Switch		" "	41	SW-A	" " " " "

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIRCASTLE PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
17	25KΩ	½		BTS-27K	Red-Grn.-Or. Osc. Grid
18	3.3 Meg.	½	1R-23	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
19	100Ω	½	1R-36	BW-½-100	Br.-Blk.-Br. IF Cathode-See Note
20	100KΩ	½		BTS-100K	Br.-Blk.-Yl. Diode Filter
21	2.2 Meg.	½	1R-13	BTS-2.2 Meg.	Red-Red-Grn. AF Grid
22	470KΩ	½	1R-11	BTS-470K	Yl.-Vi.-Yl. AF Plate Load
23	470KΩ	½	1R-11	BTS-470K	Yl.-Vi.-Yl. Output Grid
24	150Ω	½	1R-14	Bw-½-150	Br.-Grn.-Br. Output Cathode
25	2200Ω	1	1R-25	BTA-2200	Red-Red-Red Filter
26	33Ω	½	1R-17	BW-½-33	Or.-Or.-Blk. Surge Limiter
27	33Ω	½	1R-17	BW-½-33	Or.-Or.-Blk. Rect. Ballast
28	220KΩ	½	1R-20	BTS-220K	Red-Red-Yl. Line Isolation

Note-Not used in all models.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		AIRCASTLE PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
29	1800Ω	3.4Ω	150Ω	.5Ω	Part of SPK-10			A-2928	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			AIRCASTLE PART No.	JENSEN PART No.	QUAM PART No.	
30	FIELD	VC IMP.	SPK-10		4A07	
	PM	3.4Ω				
31	CONE DIA.	VC DIA.				
	4"	9/16"				

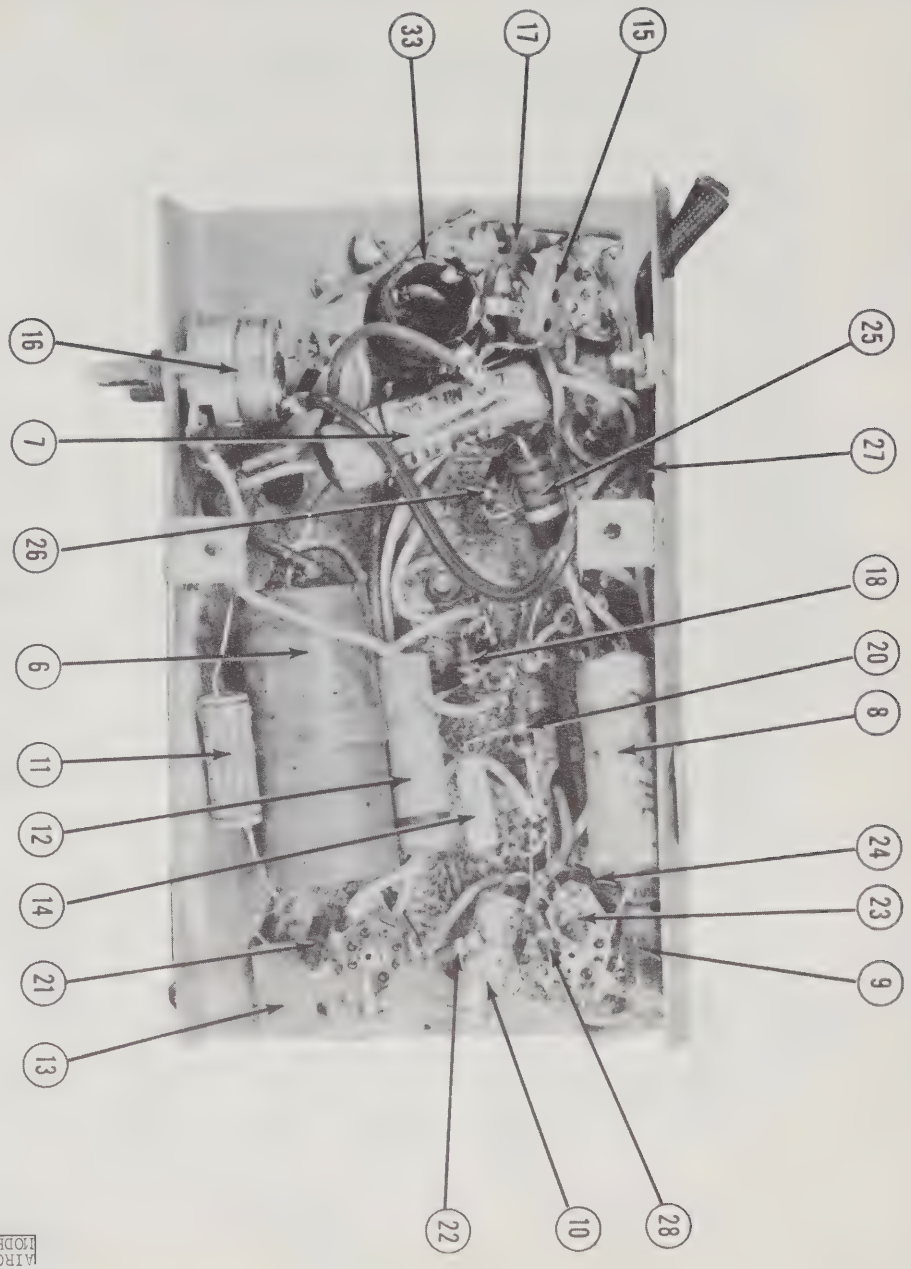
R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	AIRCASTLE PART No.	MEISSNER PART No.	
32	Loop Ant.		1.6Ω	LL-9		
33	Osc. Coil	.7Ω	7Ω	LO-13	14-1060	
34	Input IF	20.5Ω	20.5Ω	LI-6	16-6666	
35	Output IF	20.5Ω	20.5Ω	LI-7	16-6667	

MISCELLANEOUS

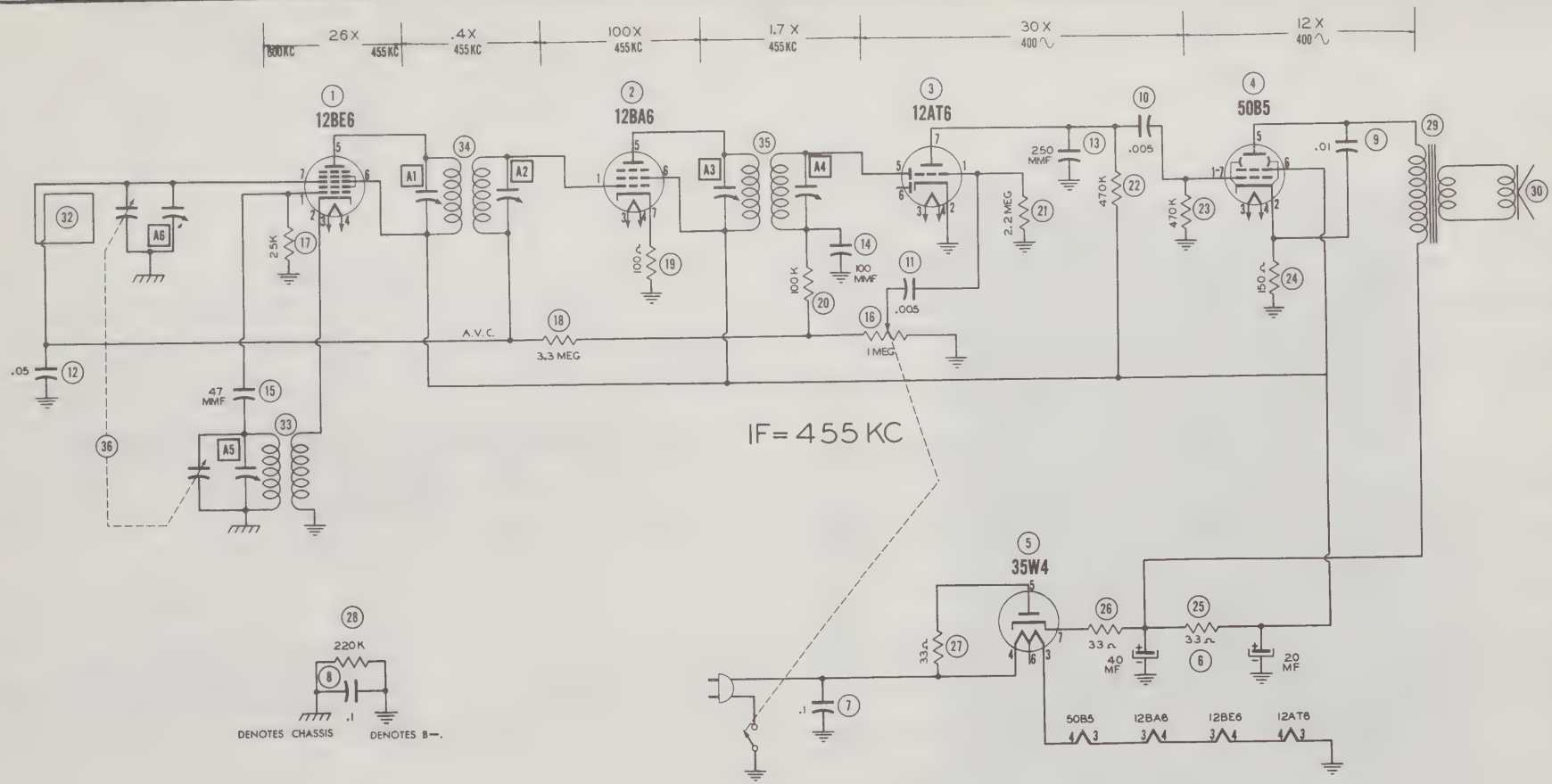
ITEM No.	PART NAME	AIRCASTLE PART No.	NOTES
36	2 Gang Var. Cap.	GC-7	(20-450MMF, 30-195MMF)

CHASSIS—BOTTOM VIEW



AIRCASTLE MODEL 5050

DATE 10/48-#4618-4 SET #48-FOLDER #4



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	12BE6	-7.2VDC§	0V.	25VAC	12VAC	75VDC	75VDC	-.2VDC
2	12BA6	-.4VDC	0V.	36VAC	25VAC	75VDC	75VDC	0V.
3	12AT6	-.5VDC	0V.	0V.	12VAC	-.2VDC	0V.	35VDC
4	50B5	0V.	4.6VDC	36VAC	85VAC	120VDC	75VDC	0V.
5	35W4	125VDC	125VDC	85VAC	117VAC	117VAC	110VAC	125VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	12BE6	25KΩ	.7Ω	25Ω	13Ω	62KΩ	62KΩ	4.3 Meg.
2	12BA6	4.3 Meg.	0Ω	38Ω	25Ω	62KΩ	62KΩ	0Ω
3	12AT6	2.2 Meg.	0Ω	0Ω	13Ω	1.1 Meg.	INF.	530KΩ
4	50B5	470KΩ	150Ω	38Ω	50Ω	60KΩ	62KΩ	470KΩ
5	35W4	60KΩ	60KΩ	90Ω	120Ω	150Ω	115Ω	60KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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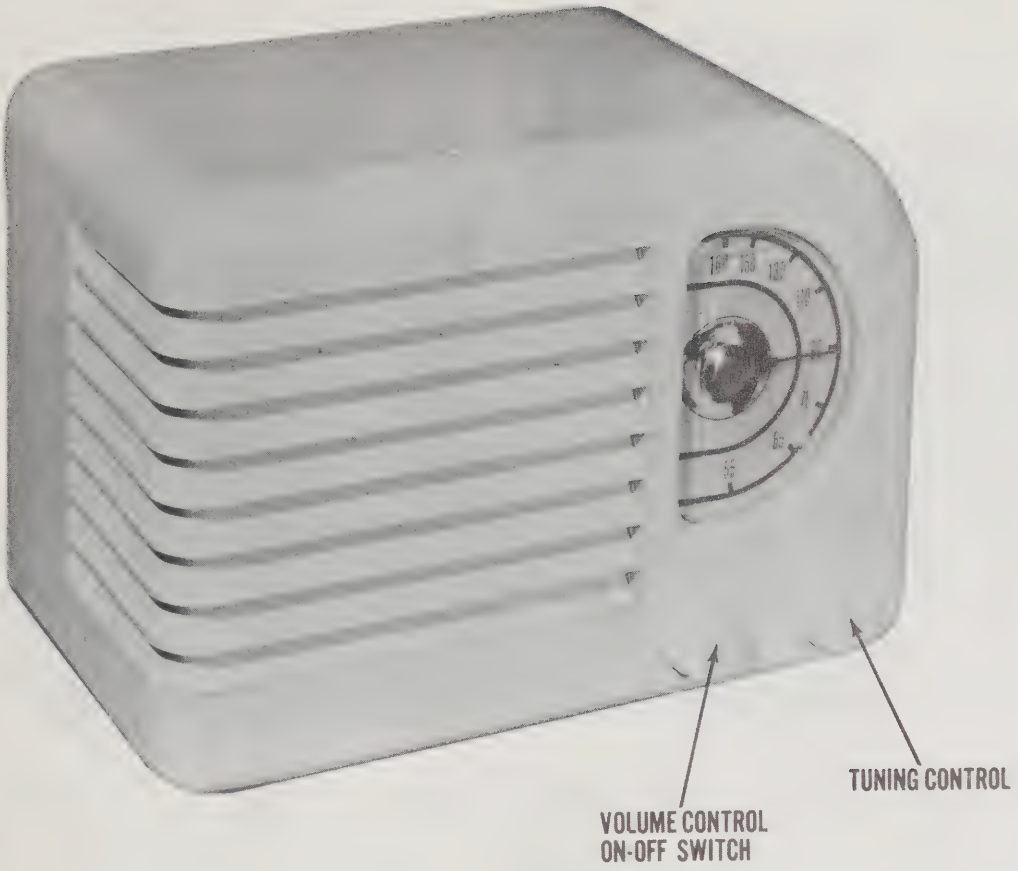
4818-4

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. **DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.**
2. **Socket connections are shown as bottom views.**
3. **Measured values are from socket pin to common negative.**
4. **Line voltage maintained at 117 volts for voltage readings.**
5. **Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.**
6. **Volume control at maximum, no signal applied for voltage measurements.**



CONCORD
MODEL 1-411

CONCORD
MODEL 1-411

CONCORD MODEL 1-411

TRADE NAME	Concord, Model 1-411
SUPPLIER	Concord Radio Corp., 901 W. Jackson Blvd., Chicago 7, Ill.
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna
TUBES (FOUR)	Types, 12SA7 Converter, 12SQ7 Det.-AVC-AF, 50L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	110-120 Volts AC-DC
TUNING RANGE—BROADCAST	540-1620KC RATING .25 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer parallel to side of dial. Use isolation transformer if available. If not, connect a .1 MFD capacitor in series with low side of signal generator and chassis.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to rear stator of tuning cap. Low side to chassis.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD to reduce hum modulation.
2	200MMFD	High side to junction of ant. hank and antenna coil (32). Low side to chassis.	1500KC	1500KC	"	A3	Adjust for maximum output.
3	200MMFD	"	1400KC	Tune for maximum output.	"	A4	" " " "

HOWARD W. SAMS & CO., INC. **Indianapolis Indiana**

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DATE 8/48-#4818-5 SET #48-FOLDER #5

PARTS LIST AND DESCRIPTIONS

CONCORD MODEL 1-411

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: CONCORD PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	12SA7	12SA7	8R	
2	Det.-AVC-AF	12SQ7	12SQ7	8Q	
3	Power Output	50L6GT	50L6GT	7AC	
4	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: CONCORD PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
5A	50	150		PRSA150-30-50	EDL5315	DSB-5030-150	TA-530	Filter-Grn.
B	30	150						Cathode Bypass-Red
6	30	150		PRS150-30	BR3015	M-30-150	UT-301	Filter
7	.02	600		684-02	DT6S2	ST-6-02	TC-12	Line Filter
8	.02	600		684-02	DT6S2	ST-6-02	TC-12	Output Plate Bypass
9	.01	200		484-01	DT2S1	ST-4-01	TC-11	Audio Coupling
10	.01	200		484-01	DT2S1	ST-4-01	TC-11	Conv. Cathode bypass
11	.05	400		484-05	DT4S5	ST-4-05	TC-15	AVC Filter
12	250	500		1468-00025	5W5T25	MO.5-325	1FM-325	AF Plate Bypass
13	2500	500		1467-0025	1W5DT25	MW.5-225	1FM-23	Audio Coupling
14	250	500		1468-00025	5W5T25	MO.5-325	1FM-325	Diode RF Filter
15	250	500		1468-00025	5W5T25	MO.5-325	1FM-325	Osc. Grid Cap.
16	50	500		1468-00005	5W5Q5	MO.5-45	1FM-45	Conv. Plate Bypass
17	6000	500		1467-006	1D5D6	MW.5-26	1FM-26	Ext. Ant. Isolation

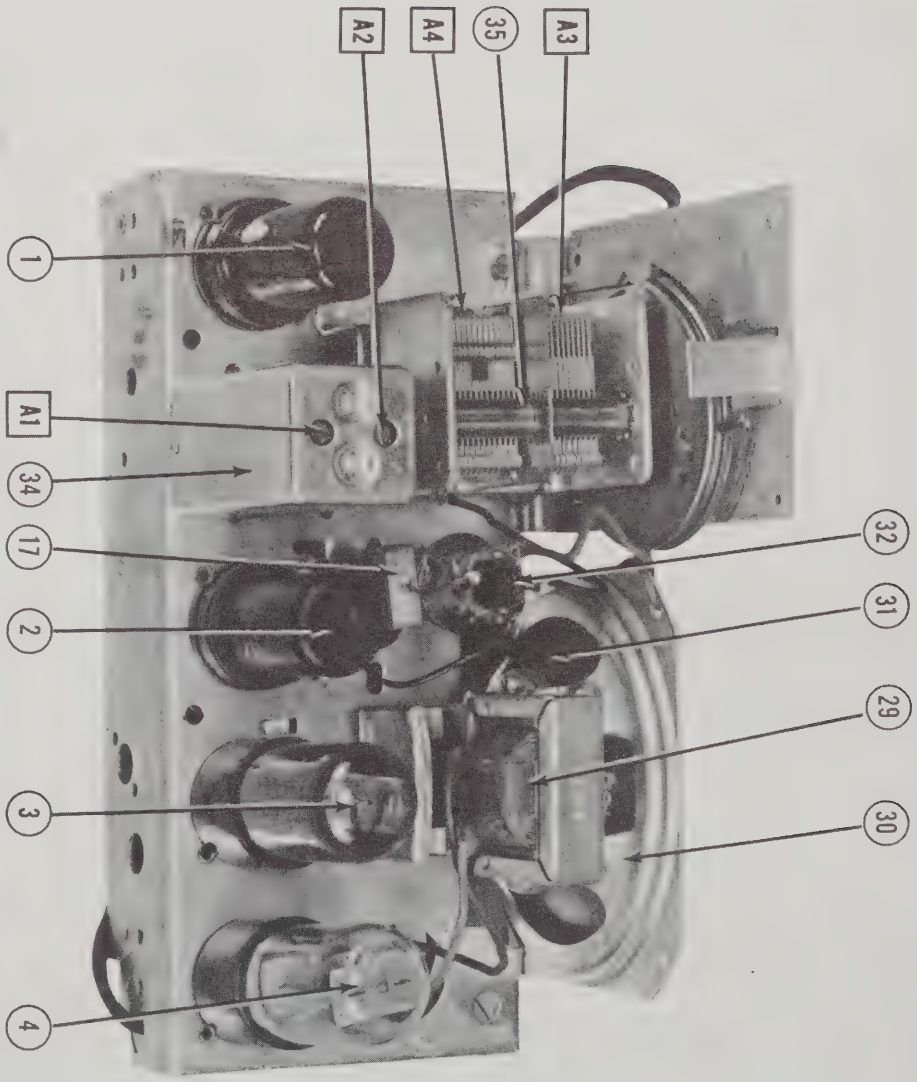
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: CONCORD PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
18A	500KΩ	½		D13-133	AM-60-Z	Volume Control
B	Shaft			E	KSS-3	Attach to 18A per instructions
C	Switch			41	SW-A	" " " " "

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: CONCORD PART No.	IRC PART No.	IDENTIFICATION CODES
19	22KΩ	½		BTS-22K	Red-Red-Or. Oscillator Grid
20	10 Meg.	½		BTS-10 Meg.	Br.-Blk.-Blue AVC Network
21	10 Meg.	½		BTS-10 Meg.	Br.-Blk.-Blue AF Grid
22	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AF Plate Load
23	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. Output Grid
24	170Ω	½		BW-½-150	Br.-Vi.-Br. Output Cathode
25	1300Ω	1		BTA-1200	Br.-Or.-Red Filter
26	200Ω	1		BW-1-220	Red-Blk.-Br. Line Dropping
27	200Ω	1		BW-1-220	Red-Blk.-Br. " "
28	33Ω	½		BW-½-33	Or.-Or.-Blk. Converter Cathode

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		CONCORD PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
29	1700Ω	3.2Ω	180Ω	.8Ω	Part of 6867	A-3876*	T22S45*	A-2928*	*Bend mounting tabs down, file out slots and mount on original bracket.

SPEAKER

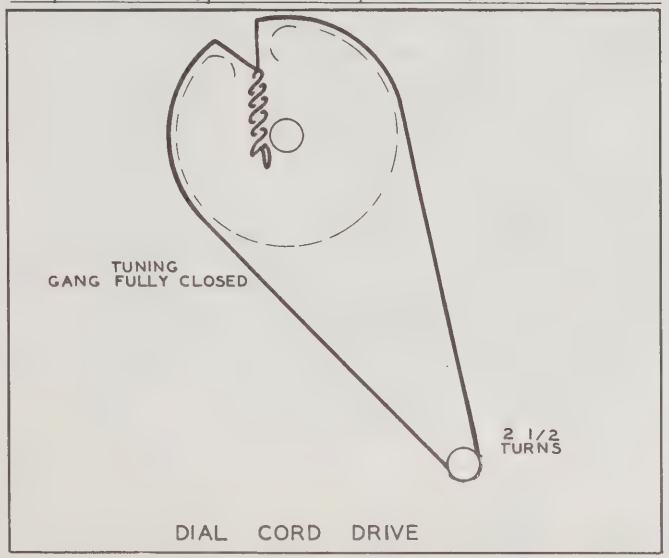
ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
	FIELD	VC IMP.	CONCORD PART No.	JENSEN PART No.	QUAM PART No.	
30	PM	3.2Ω	6867	ST-113 Mod. P4-X	4A07	
	CONE DIA.	VC DIA.				
31	4"	9/16"	CONE HAS SPECIAL ADJUSTMENT FEATURE-ORDER FROM MANUFACTURER			

R F COILS

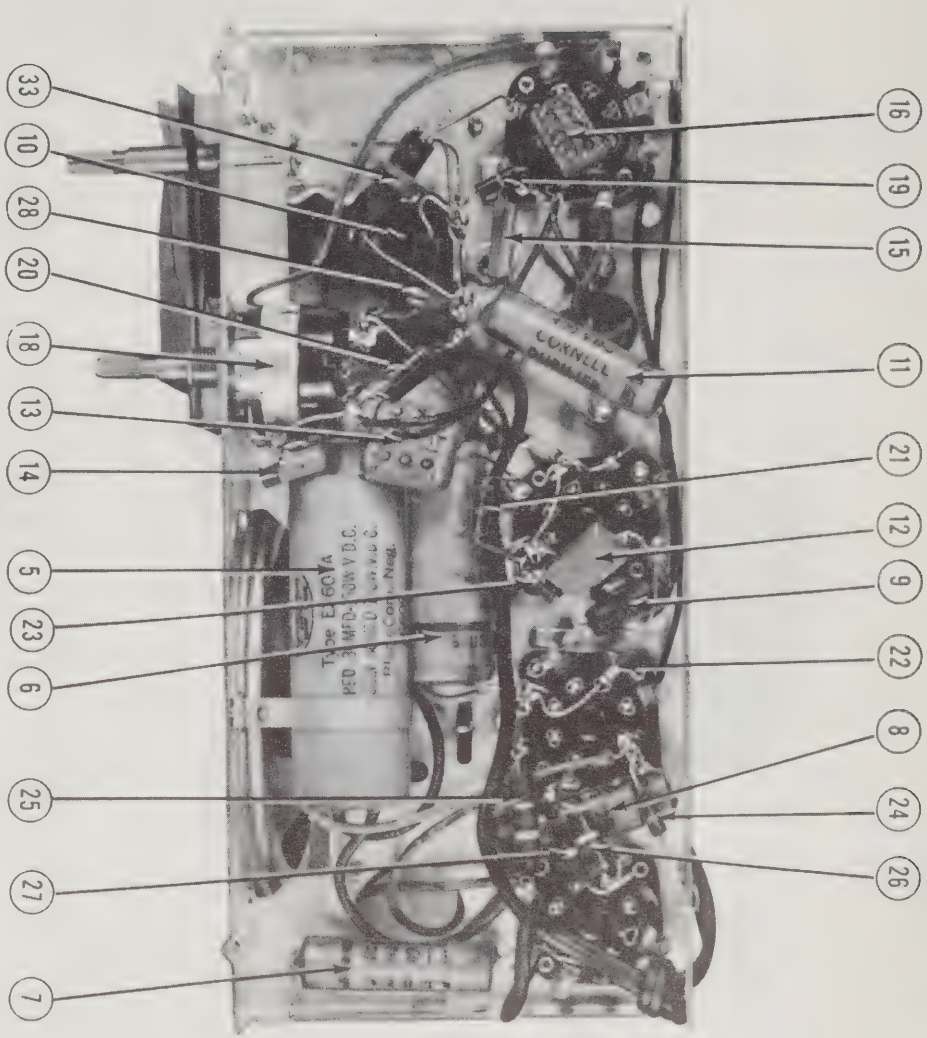
ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PRI.	SEC.	CONCORD PART No.	MEISSNER PART No.
32	Ant. Coil	50Ω	5Ω		14-1056
33	Osc. Coil		4.5Ω		14-1060
34	IF Trans.	14Ω	14Ω		16-6660

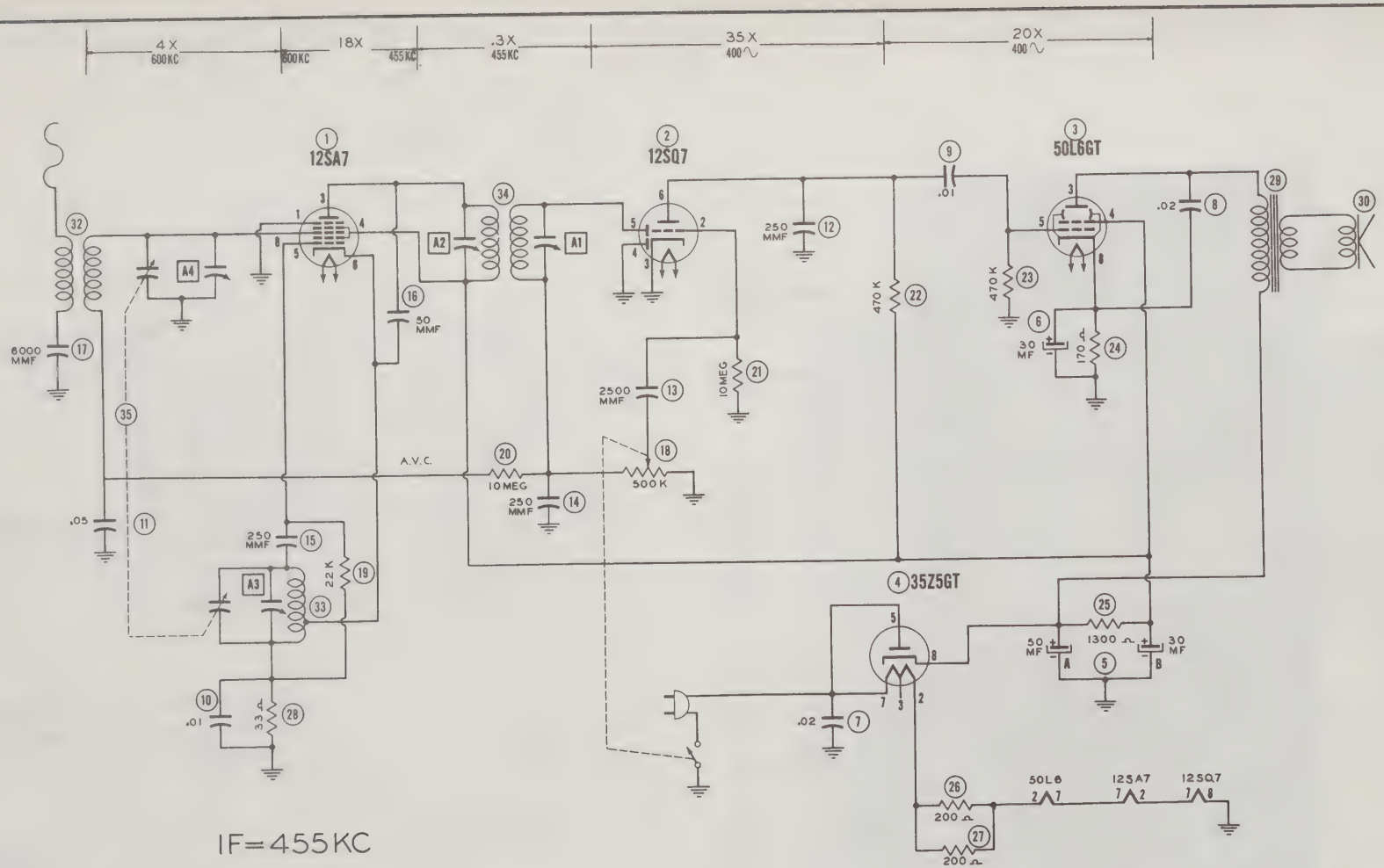
MISCELLANEOUS

ITEM No.	PART NAME	CONCORD PART No.	NOTES
35	2 Gang Var. Cap.		(38-485MMF, 34-205MMF)



CHASSIS—BOTTOM VIEW





IF=455KC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7	0V.	11VAC	112VDC	112VDC	-.16VDC§	.4VDC	23VAC	0V.
2	12SQ7	0V.	-.5VDC	0V.	0V.	-.2VDC	62VDC	11VAC	0V.
3	50L6GT	0V.	68VAC	127VDC	112VDC	0V.	0V.	23VAC	8VDC
4	35Z5GT	0V.	85VAC	94VAC	0V.	117VAC	0V.	117VAC	135VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7	0Ω	12Ω	30KΩ	30KΩ	22KΩ	34Ω	25Ω	10 Meg.
2	12SQ7	0Ω	10 Meg.	0Ω	0Ω	500KΩ	500KΩ	12Ω	0Ω
3	50L6GT	INF.	75Ω	30KΩ	30KΩ	470KΩ	INF.	25Ω	170Ω
4	35Z5GT	INF.	180Ω	190Ω	INF.	220Ω	INF.	220Ω	30KΩ

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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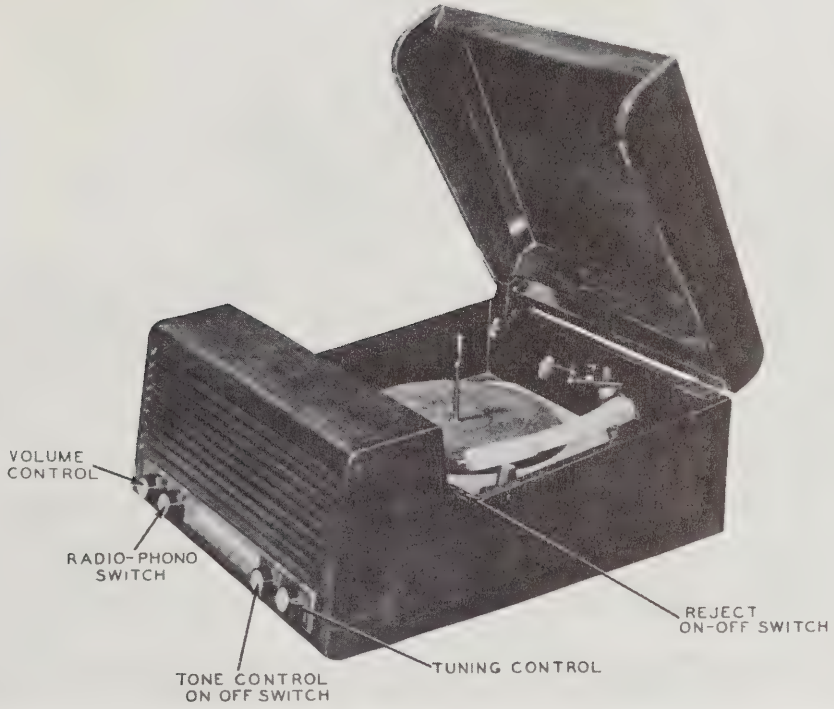
4818-5

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. **DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.**
2. **Socket connections are shown as bottom views.**
3. **Measured values are from socket pin to common negative.**
4. **Line voltage maintained at 117 volts for voltage readings.**
5. **Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.**
6. **Volume control at maximum, no signal applied for voltage measurements.**

DETROLA
MODEL 7156



DETROLA MODEL 7156

TRADE NAME	Detrola, Model 7156
MANUFACTURER	International Detrola Corp., 1501 Beard St., Detroit, Mich.
TYPE SET	AC Operated Combination Auto. Phono-Superheterodyne Receiver with Self-Contained Loop Antenna
TUBES (FIVE)	Types, 12BE6 Converter, 12BA6 IF Amp., 12AT6 Det.-AVC-AF, 50B5 Power Output, 35W4 Rectifier.
POWER SUPPLY	110-120 Volts AC
TUNING RANGE—BROADCAST	540-1600KC RATING .250 Amps. @ 117V AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer if available. If not, connect a capacitor in series with low side of signal generator and B-. Volume should be at maximum, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to grid 12BE6 (Pin 7). Low side to B-.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD. to reduce hum modulation.
2	.1 MFD.	"	1620KC	"	"	A5	"
3		Loop	1400KC	Tune for maximum output.	"	A6	Place receiver in cabinet. Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust A6 from back of cabinet for maximum output.

DISASSEMBLY INSTRUCTIONS

1. Remove four push-on type control knobs.
2. Remov eight screws holding loop antenna to rear of cabinet.
3. Remove eight Phillips heads screws from bottom cover board.
4. Unsolder phono pick-up leads from terminal strip. (Shield to shield and black to brown).
5. Disconnect phono-motor leads.
6. Unsolder leads to loop antenna. Remove loop antenna.
7. Remove ground lead to motor frame.
8. Remove screw holding terminal strip connecting to phono-pickup leads.
9. Remove screw holding antenna trimmer.
10. Remove two bolts holding chassis. Remove chassis.
11. Remove three screws holding chassis shield. Remove shield.

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PARTS LIST AND DESCRIPTIONS

DETROLA MODEL 7156

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		DETROLA PART No.	STANDARD REPLACEMENT		
1	Converter	12BE6	12BE6	7CH	
2	IF Amp.	12BA6	12BA6	7CC	
3	Det.-AVC-AF	12AT6	12AT6	7BT	
4	Power Output	50B5	50B5	7BZ	
5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	DETROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
6A	40	150	B-9564-1	PRSA150-40-40	BRD4215	M-2x40-150	TA-240	Filter-Red
B	20	150					"	-Blue
7	.05	400	BD410503	484-05	DT4S5	ST-4-05	TC-15	Line Filter
8	.05	400	BD410503	484-05	DT4S5	ST-4-05	72P1	Line Isolation
9	.02	400	BD410203	484-02	DT4S2	ST-4-02	TC-13	Output Plate Bypass
10	.003	600	BD610302	684-003	DT6D3	ST-6-003	TC-23	Tone Compensation
11	.01	400	BD410103	484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
12	.1	400	BD410104	484-.1	DT4P1	ST-4-1	TC-1	Audio Plate Decoup.
13	.01	400	BD410103	484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
14	.1	400	BD410104	484-.1	DT4P1	ST-4-1	TC-1	Shield Isolation
15	.05	200	BD210503	484-05	DT4S5	ST-4-05	TC-15	AVC Filter
16	220	500	BM74A221	1468-0002	5W5T2	MO.5-32	1FM-32	Audio Plate Bypass
17	100	500	BM74A101	1468-0001	5W5T1	MO.5-31	1FM-31	Osc. Grid Capacitor

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	DETROLA PART No.	IRC PART No.	CLAROSTAT PART No.	
18A	500KΩ	1	B-57841-1	D13-133	AM-60-Z	Tone Control
B	Shaft		Not Req.	E	KSS-3	Attach to 18A per instructions
C	Switch		" "	41	SW-A	" " " " "
19A	500KΩ	1	B-54466-2	D13-133	AM-60-Z	Volume Control
B	Shaft		Not Req.	E	KSS-3	Attach to 19A per instructions

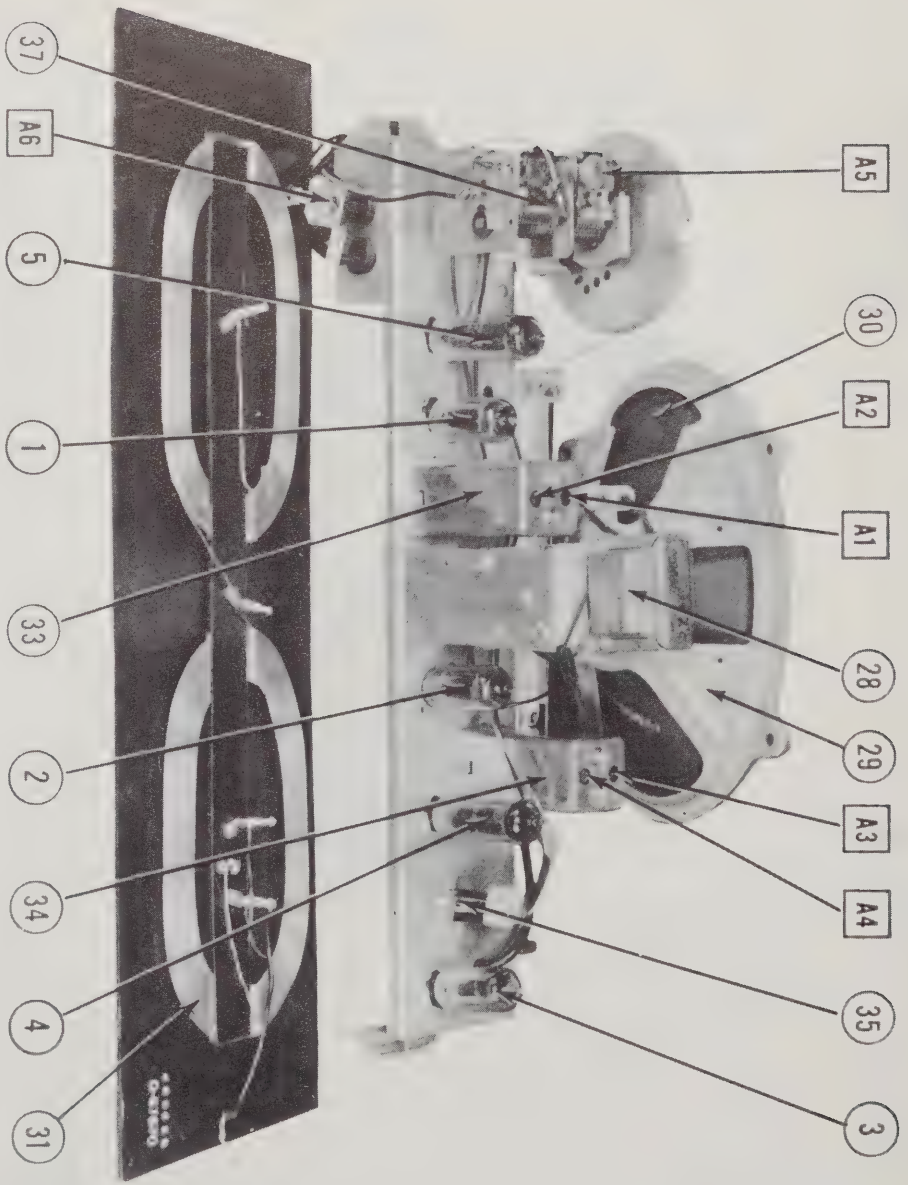
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	DETROLA PART No.	IRC PART No.	
20	22KΩ	1/3	BR17B223	BTS-22K	Red-Red-Or. Oscillator Grid
21	68Ω	1/3	BR16B680	BW-½-68	Blue-Gray-Blk. IF Cathode
22	3.3 Meg.	1/3	BR17B335	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
23	6.8 Meg.	1/3	BR17B685	BTS-6.8 Meg.	Blue-Gray-Grn. AF Grid
24	220KΩ	1/3	BR17B224	BTS-220K	Red-Red-Yl. AF Plate Load
25	100KΩ	1/3	BR17B104	BTS-100K	Br.-Blk.-Yl. AF Plate Decoupling
26	150Ω	1/2	BR16C151	BW-½-150	Br.-Grn.-Br. Output Cathode
27	1500Ω	1	BR17E152	BTA-1500	Br.-Grn.-Red Filter

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		DETROLA PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
28	2200Ω	3.6Ω	245Ω	.7Ω	Part of C-57843	A-3876*	T22S45*	A-2928*	*Bend mounting tabs down, file out slots and mount on original bracket.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: DETROLA PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
29	FIELD PM	VC IMP. 3.6Ω	C-57843			
30	CONE DIA. 4-15/16" x 7-1/8"	VC DIA. 3/4"				

R F COILS

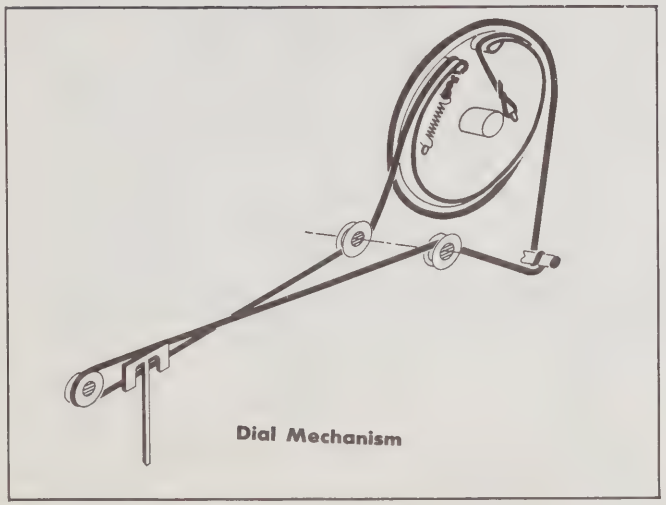
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: DETROLA PART No.	REPLACEMENT DATA: MEISSNER PART No.
31	Loop Ant.	.1Ω	1.7Ω	D-57870	
32	Osc. Coil	1Ω	5.7Ω	B-57842	
33	Input IF	2.6Ω	28.5Ω	B-56722-1	16-6666
34	Output IF	1Ω		B-56718-1	16-6670

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: DETROLA PART No.	REPLACEMENT DATA	INSTALLATION NOTES
35	Bayonet	6-8	0.15	Brown	A-6158		Type 47

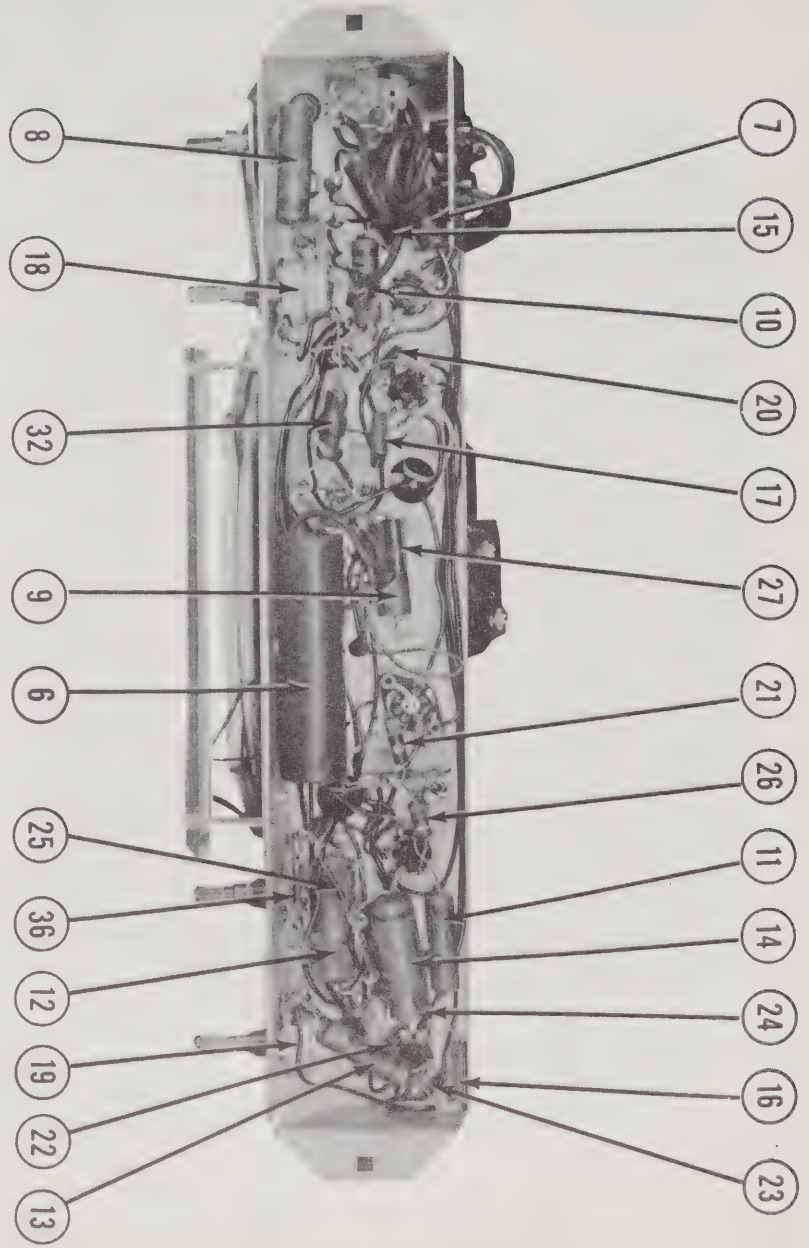
MISCELLANEOUS

ITEM No.	PART NAME	DETROLA PART No.	NOTES
36	Switch	B-51576-2	Radio-Phono
37	2 Gang Var. Cap.	C-57859-1	(12-455MMF, 30-190MMF)
A6	Trimmer Cap.	B-57879-1	Ant. Adj.
	Dial Pointer	B-57857-1	
	Knob	C-57872-1	
	Cabinet	E-57873-1	
	Dial	C-57882-1	Crystal & Indicator

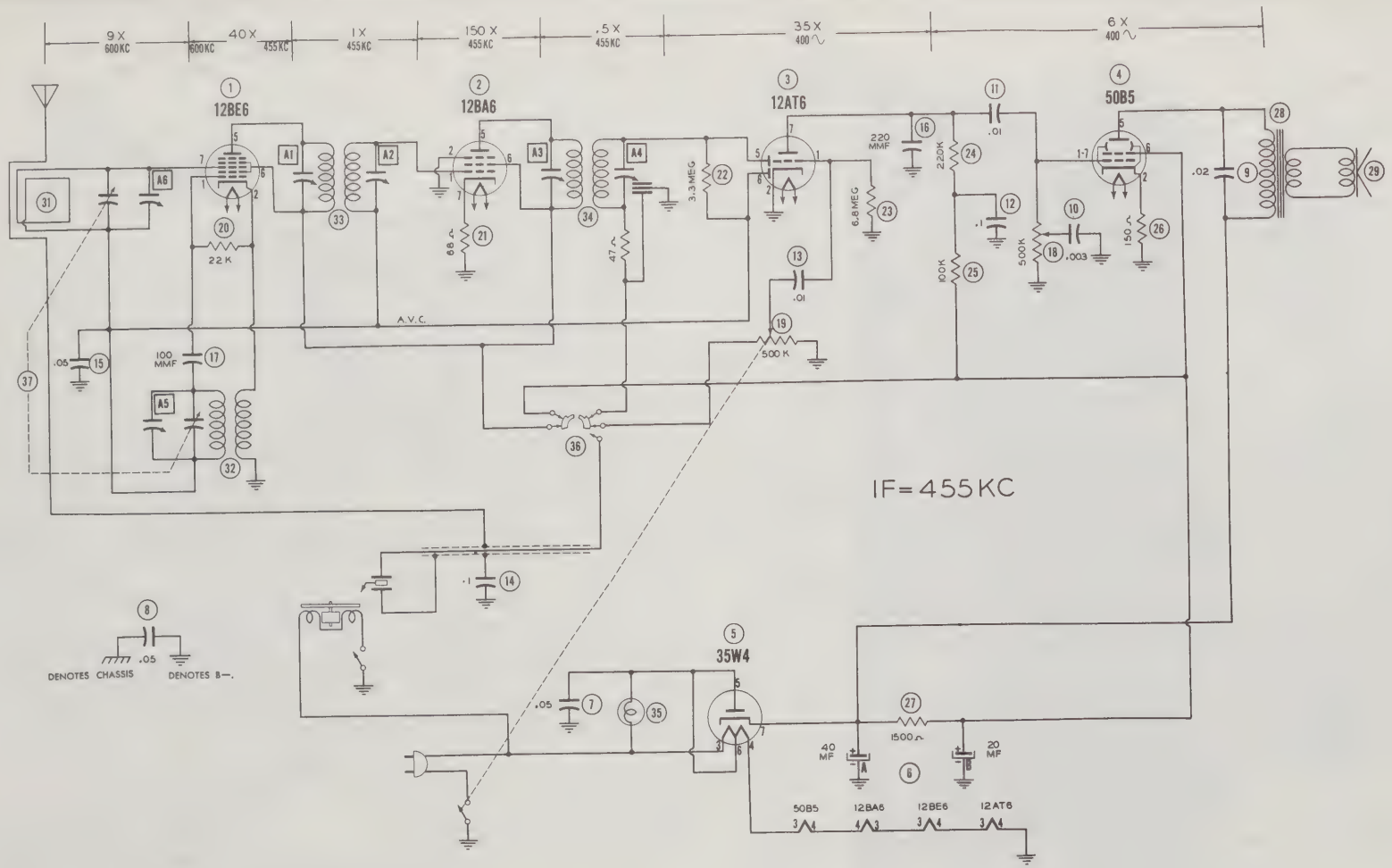


Dial Mechanism

CHASSIS—BOTTOM VIEW



DETROLA MODEL 7156



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	12BE6	-5.6VDC	0V.	24VAC	12VAC	92VDC	92VDC	-.35VDC
2	12BA6	-.35VDC	0V.	24VAC	37VAC	92VDC	92VDC	.6VDC
3	12AT6	-.55VDC	0V.	12VAC	0V.	-.4VDC	-.35VDC	50VDC
4	50B5	0V.	5.9VAC	87VAC	37VAC	117VDC	92VDC	0V.
5	35w4	0V.	0V.	87VAC	117VAC	113VAC	113VAC	125VDC

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	12BE6	19KΩ	.8Ω	21Ω	11Ω	140KΩ	140KΩ	3.5 Meg.
2	12BA6	3.5 Meg.	0Ω	21Ω	31Ω	140KΩ	140KΩ	6.2M
3	12AT6	7 Meg.	0Ω	11Ω	0Ω	420KΩ	3.5 Meg.	460KΩ
4	50B5	400KΩ	130Ω	72Ω	31Ω	140KΩ	140KΩ	400KΩ
5	35W4	INF.	INF.	72Ω	98Ω	95Ω	95Ω	140KΩ

VOLTAGE AND RESISTANCE READINGS TAKEN IN RADIO POSITION.
RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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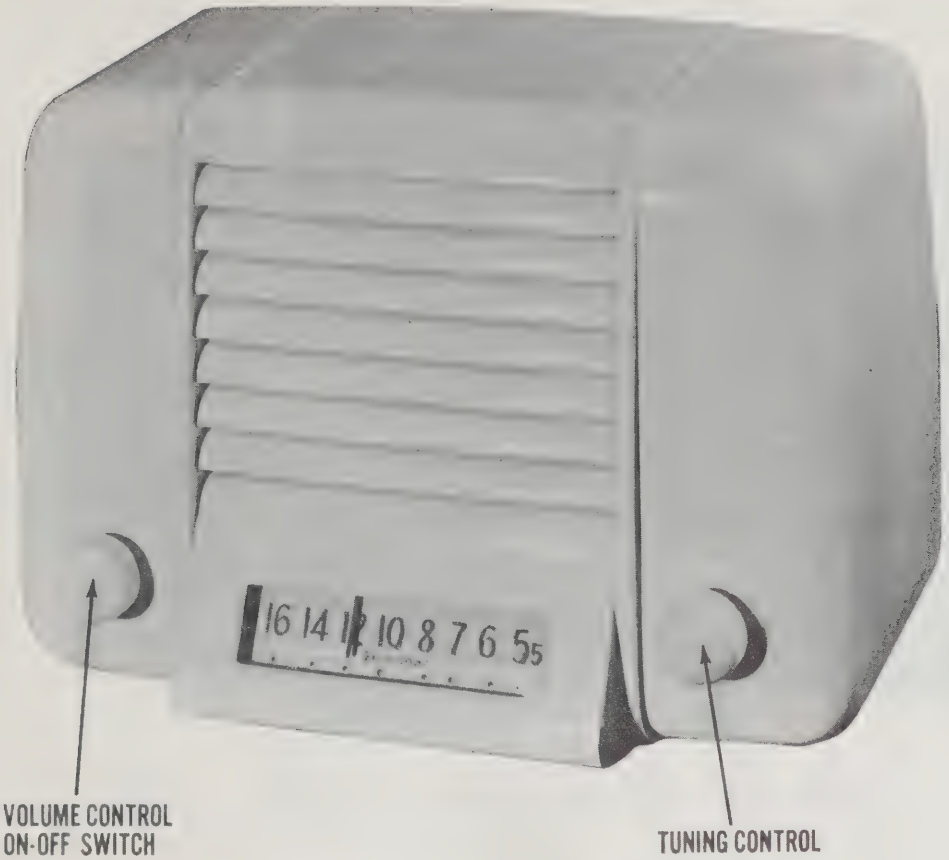
4818-6

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

FIRESTONE (AIR CHIEF)
MODEL 4-A-61 (CODE #332-8-137JZT)



FIRESTONE (AIR CHIEF)
MODEL 4-A-61 (CODE #332-8-137JZT)

FIRESTONE MODEL 4-A-61

TRADE NAME	Firestone, Model 4-A-61 (Code #332-8-137JZT)
SUPPLIER	Firestone Tire & Rubber Co., Akron, Ohio
TYPE SET	AC-DC Operated Superheterodyne Receiver with loop antenna
TUBES (FIVE)	Types, 12SA7 Converter, 12SK7 IF Amp., 12SQ7 Det.-AVC-AF, 50L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	105-125 Volts AC-DC
TUNING RANGE—BROADCAST	540-1630KC RATING .26 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer if available. If not, connect a .1 MFD capacitor in series with low side of signal generator and B-.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to large stator of tuning cap. Low side to B-.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD. to reduce hum modulation.
2	250MMFD	High side to ext. ant. lead. Low side to B-.	1630KC	"	"	A5	Adjust for maximum output.
3	250MMFD	"	1400KC	Tune for maximum output.	"	A6	Rock tuning cap. and adjust for maximum output.

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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DATE 10/48-#4818-7 SET #48-FOLDER #7

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		FIRESTONE PART No.	STANDARD REPLACEMENT		
1	Converter	12SA7	12SA7	8R	
2	IF Amp.	12SK7	12SK7	8N	
3	Det.-AVC-AF	12SQ7	12SQ7	8Q	
4	Power Output	50L6GT	50L6GT	7AC	
5	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	FIRESTONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
6A	30	150	B18-283	PRSA150/30-30	EZ3315	DSB-2x30-150	TA-330	Filter-Red
B	30	150					"	-Yellow
7	.05	400	A16-158	484-05	DT4S5	ST-4-05	TC-15	Line Filter
8	.1	400	A16-160	484-.1	DT4P1	ST-4-1	72P2	Line Isolation
9	.01	400	A16-156	484-01	DT4S1	ST-4-01	TC-11	Output Plate Bypass
10	.01	400	A16-156	484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
11	.005	600	A16-153	684-005	DT6D5	ST-6-005	TC-25	" "
12	.05	200	A16-152	484-05	DT2S5	ST-4-05	TC-15	RF Bypass Power Supply
13	.05	200	A16-152	484-05	DT2S5	ST-4-05	TC-15	AVC Filter
14	.02	400	A16-150	484-02	DT4S2	ST-4-02	TC-12	Osc. Tuning Cap. Isol.
15	.01	400	A16-156	484-01	DT4S1	ST-4-01	TC-11	Ant. Isolation
16	250	500	A15-176	1468-00025	5W5T25	MO.5-325	1FM-325	AF Plate Bypass
17	250	500	A15-176	1468-00025	5W5T25	MO.5-325	1FM-325	Diode RF Filter
18	50	500	A15-175	1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap.
19	250	500	A15-176	1468-00025	5W5T25	MO.5-325	1FM-325	RF Coupling

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	FIRESTONE PART No.	IRC PART No.	CLAROSTAT PART No.	
20A	1 Meg.	½	24-157	D13-137	AM-63-Z	Volume Control
B	Shaft		Not Req.	E	KSS-3	Attach to 20A per instructions
C	Switch		" "	41	SW-A	" " " " "

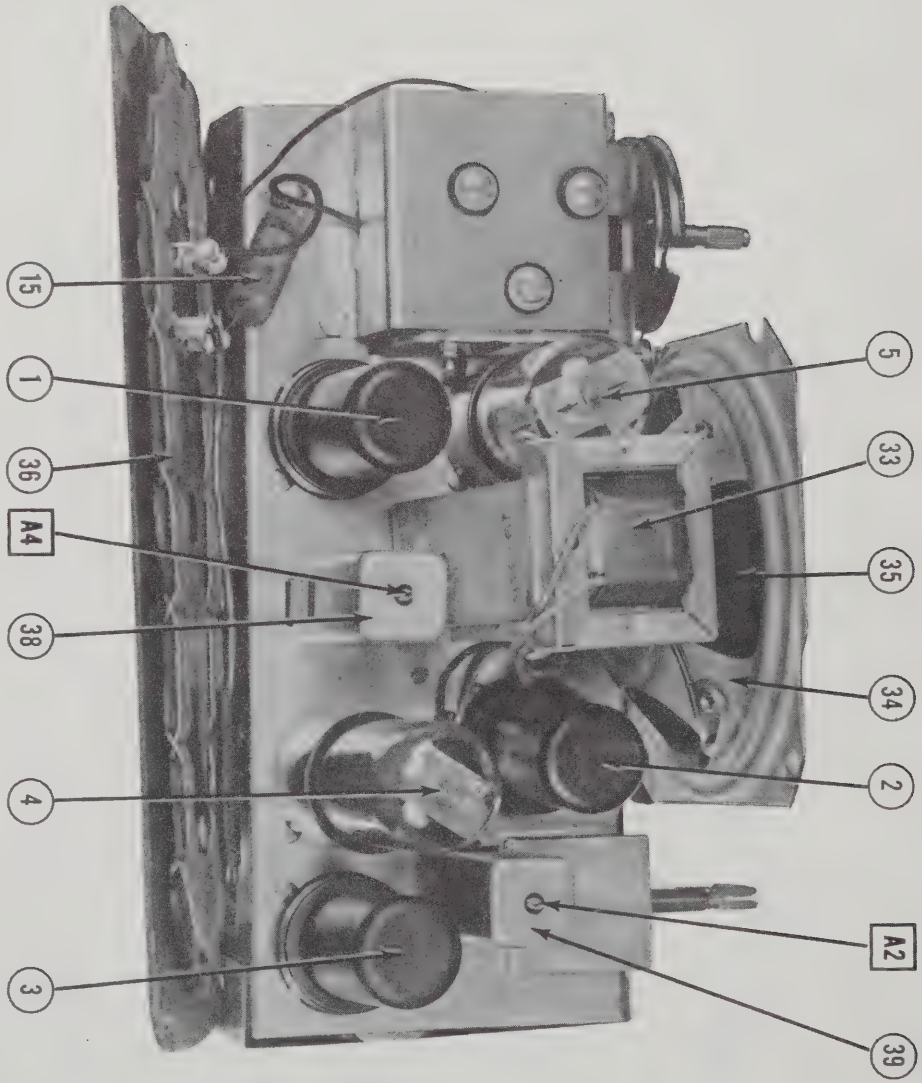
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	FIRESTONE PART No.	IRC PART No.	
21	1 Meg.	½	A60-668	BTS-1 Meg.	Br.-Blk.-Grn. Conv. Grid
22	22KΩ	½	A60-659	BTS-22K	Red-Red-Or. Osc. Grid
23	2.2 Meg.	½	A60-684	BTS-2.2 Meg.	Red-Red-Grn. AVC Network
24	10 Meg.	½	A60-663	BTS-10 Meg.	Br.-Blk.-Blue AF Grid
25	220KΩ	½	A60-667	BTS-220K	Red-Red-Yl. AF Plate Load
26	470KΩ	½	A60-662	BTS-470K	Yl.-Vi.-Yl. Output Grid
27	120Ω	½	A60-702	BW-½-120	Br.-Red-Br. Output Cathode
28	10KΩ	1	A60-698	BTA-10K	Br.-Blk.-Or. Output Cathode Dropping
29	1000Ω	1	A60-732	BTA-1000	Br.-Blk.-Red Filter
30	27Ω	½	A60-690	BW-½-27	Red-Vi.-Blk. Rectifier Ballast
31	470KΩ	½	A60-662	BTS-470K	Yl.-Vi.-Yl. Line Isolation
32	47KΩ	½		BTS-47K	Yl.-Vi.-Or. Diode Filter

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		FIRESTONE PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
33	4500Ω	3.4Ω	240Ω	.4Ω	Part of 79-316	A-3876#	T22846#	A-2901#	#Bend mounting tabs down, file out slots and mount on original bracket.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

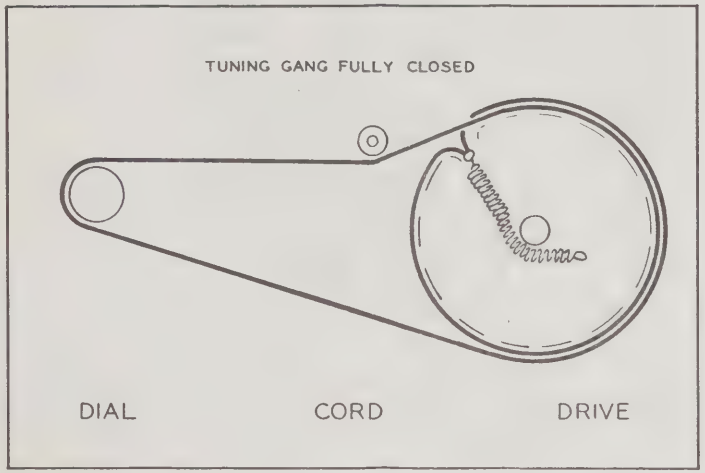
ITEM No.	RATINGS		REPLACEMENT DATA: FIRESTONE PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	VC IMP.		ST-113†		†Fabricate new mounting bracket.
34	PM	3.4Ω	79-316	Mod. P4-X	4A07†	
	CONE DIA.	VC DIA.				
35	.4"	9/16"				

R F COILS

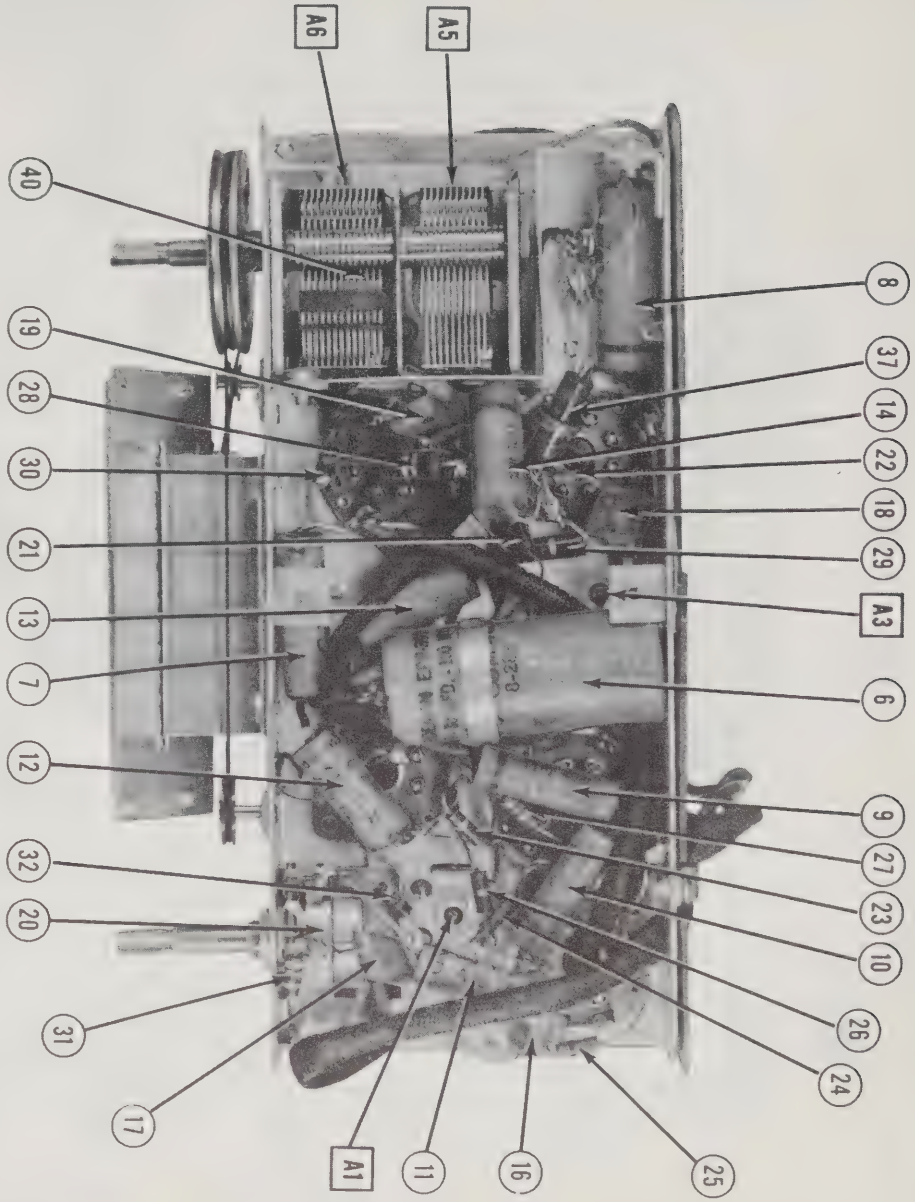
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: FIRESTONE PART No.	REPLACEMENT DATA: MEISSNER PART No.
36	Loop Ant.	.1Ω	1.7Ω	B82-46	
37	Osc. Coil		4.8Ω	B10-480	14-1060
38	Input IF	16Ω	19Ω	C10-475	16-6678
39	Output IF	20Ω	24Ω	A10-479	16-6678

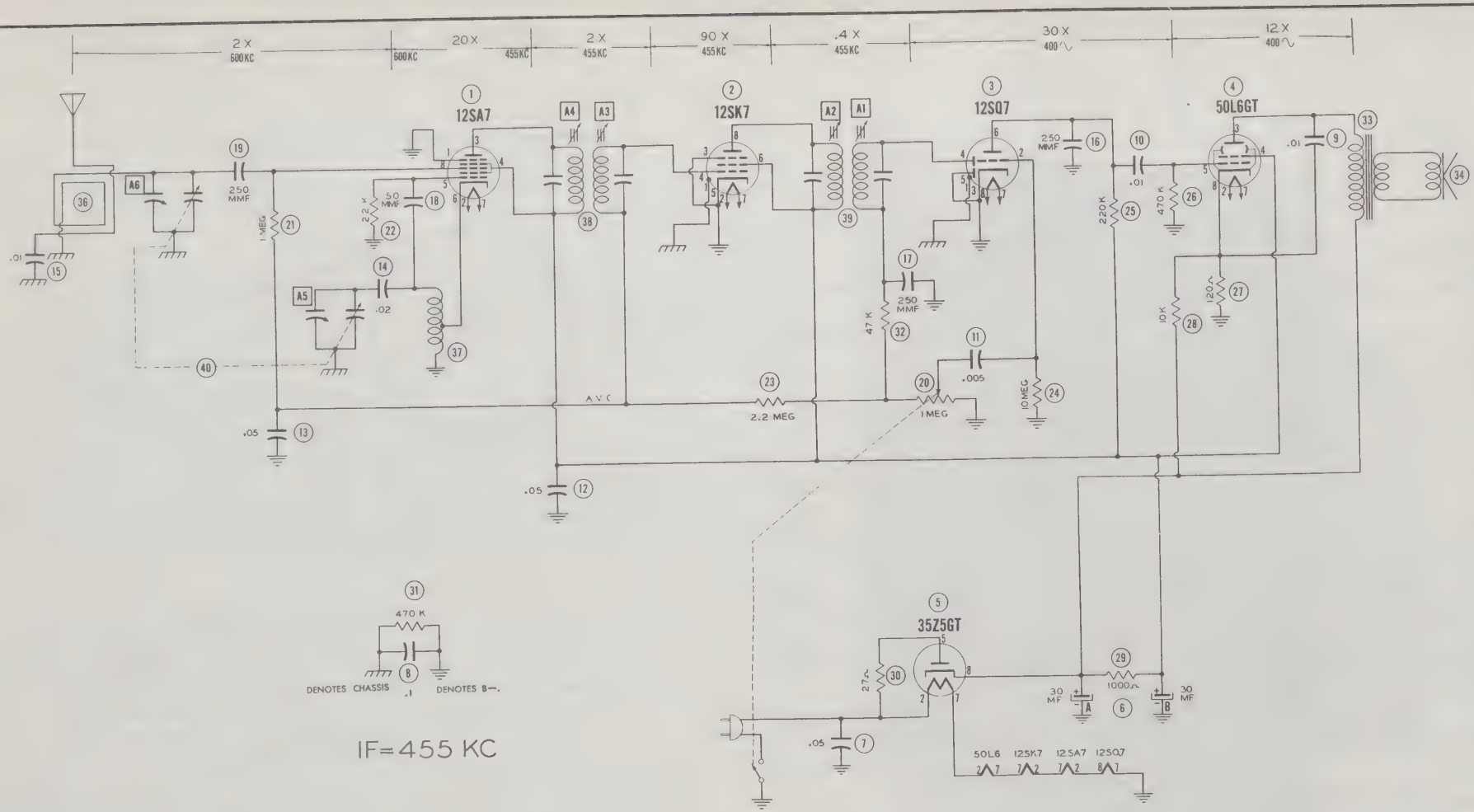
MISCELLANEOUS

ITEM No.	PART NAME	FIRESTONE PART No.	NOTES
40	2 Gang Var. Cap.	19-173	17-361MMF, 43-217MMF)
	Cabinet	A42-425	
	Dial Scale	B67-519	
	Dial Pointer	58-37	
	Knob	A52-226	



CHASSIS—BOTTOM VIEW





IF = 455 KC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7	0V.	12VAC	90VDC	90VDC	-0.4VDC§	0V.	[illegible]	0V.
2	12SK7	0V.	25VAC	0V.	-.2VDC	0V.	90VDC	36VAC	90VDC
3	12SQ7	0V.	0V.	0V.	0V.	-.4VDC	[illegible]VDC	0V.	12VAC
4	50L6GT	0V.	85VAC	110VDC	90VDC	0V.	-.4 Meg.	36VAC	6.2VDC
5	35Z5GT	0V.	117VAC	108VAC	6.2VDC	113VAC	0V.	85VAC	120VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7	INF.	13Ω	11KΩ	11KΩ	22KΩ	0Ω	29Ω	4.2 Meg.
2	12SK7	470KΩ	29Ω	0Ω	3.2 Meg.	0Ω	11KΩ	40Ω	11K
3	12SQ7	470KΩ	10 Meg.	0Ω	0Ω	1 Meg.	230KΩ	0Ω	13Ω
4	50L6GT	INF.	90Ω	10KΩ	11KΩ	470KΩ	3 Meg.	40Ω	120Ω
5	35Z5GT	INF.	130Ω	120Ω	120Ω	160Ω	INF.	90Ω	10KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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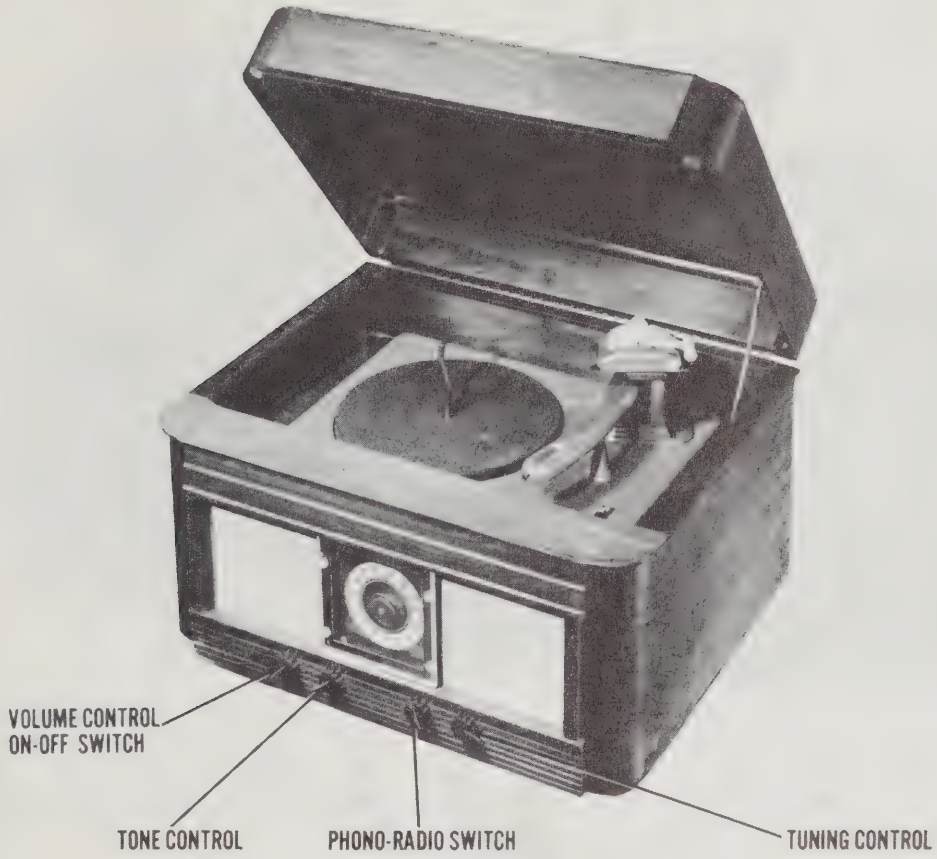
4818-7

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. **DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.**
2. **Socket connections are shown as bottom views.**
3. **Measured values are from socket pin to common negative.**
4. **Line voltage maintained at 117 volts for voltage readings.**
5. **Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.**
6. **Volume control at maximum, no signal applied for voltage measurements.**

GAROD
MODEL 306



GAROD
MODEL 306

GAROD MODEL 306

TRADE NAME	Garod, Model 306
MANUFACTURER	Garod Radio Corp., 70 Washington St., Brooklyn, New York
TYPE SET	AC Operated Combination Phono-Radio, Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types, 12SA7GT Converter, 14A7 IF Amp., 12SQ7GT Det.-AVC-AF, 50L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	105-125 Volts AC
TUNING RANGE—BROADCAST	540-1650KC RATING .23 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and chassis.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to rear stator of tuning cap. Low side to chassis.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD. to reduce hum modulation.
2		Loop	1650KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	1500KC	Tune for maximum output.	"	A6	Adjust for maximum output.

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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DATE 10/48-#4818-8 SET #48-FOLDER #8

PARTS LIST AND DESCRIPTIONS

GAROD MODEL 306

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: GAROD PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	12SA7GT	12SA7GT	8AD	
2	IF Amp.	14A7	14A7	8V	
3	Det.-AVC-AF	12SQ7GT	12SQ7GT	8Q	
4	Power Output	50L6GT	50L6GT	7AC	
5	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: GAROD PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	40	150	5.400-7	AF888D	UP84215	DY804020-150	EL340	▲ Filter
B	80	150		PRS150/20			UT201	◘ "
C	20	150						
7	10	50		PRS50/10	BR105	M-10-50	TA-510	Cathode Bypass
8	.05	400		484-05	DT4S5	ST-4-05	TC-15	Line Filter
9	.02	400		484-02	DT4S2	ST-4-02	TC-12	Output Plate Byp.
10	.01	400		484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
11	.01	400		484-01	DT4S1	ST-4-01	TC-11	" "
12	.002	600		684-002	DT6D2	ST-6-002	TC-22	Tone Comp.
13	.02	400		484-02	DT4S2	ST-4-02	TC-12	AVC Filter
14	.005	600		684-005	DT6D5	ST-6-005	TC-25	External Loop Isol.
15	.02	400		484-02	DT4S2	ST-4-02	TC-12	Phono Isolation
16	220	300		1468-0002	5W5T2	MO.5-32	1FM-32	AF Plate Bypass-Cer.
17	220	300		1468-0002	5W5T2	MO.5-32	1FM-32	Diode RF Filter- "
18	220	300		1468-0002	5W5T2	MO.5-32	1FM-32	Tone Comp.-Cer.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: GAROD PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
19A	1 Meg.	½	8-200-4	D13-137	AM-63-Z	Volume Control
B			Not Req.	E	KSS-3	Attach to 19A as per instructions
C			" "	41	SW-A	" " " " " " "
20A	11 Meg.	½		D13-137	AM-63-Z	Tone Control
B	Shaft			E	KSS-3	Attach to 20A as per instructions

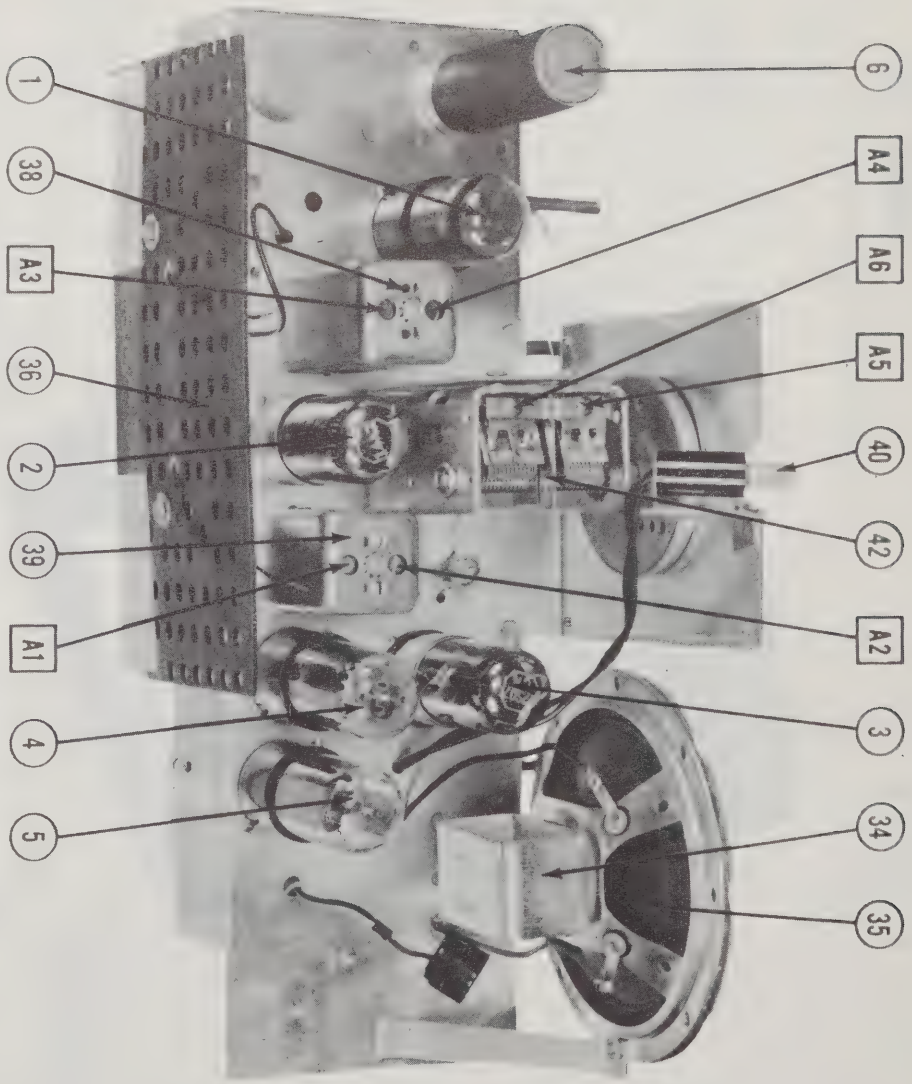
RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: GAROD PART No.	IRC PART No.	IDENTIFICATION CODES
21	22KΩ	½		BTS-22K	Red-Red-Or. Osc. Grid
22	270Ω	½		BW-½-270	Red-Vi.-Br. IF Cathode
23	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
24	47KΩ	½		BTS-47K	Yl.-Vi.-Or. Diode Filter
25	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. Phono Isolation
26	150KΩ	½		BTS-150K	Br.-Grn.-Yl. Tone Comp.
27	10 Meg.	½		BTS-10 Meg.	Br.-Blk.-Blue AF Grid
28	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AF Plate Load
29	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. Output Grid
30	150Ω	½		BW-½-150	Br.-Grn.-Br. Output Cathode
31	1000Ω	1		BTA-1000	Br.-Blk.-Red Filter
32	100Ω	½		BW-½-100	Br.-Blk.-Br. "

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: GAROD PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	INSTALLATION NOTES
33	1870Ω	2.5Ω	150Ω	.45Ω	9.200	A-3876	T22S45	A-2928	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
	FIELD	VC IMP.	GAROD PART No.	JENSEN PART No.	QUAM PART No.	
34	PM	3.5Ω	30.318	ST-105 Mod. P5-X	5A07	
	CONE DIA.	VC DIA.				
35	4-5/8"	9/16"				

R F COILS

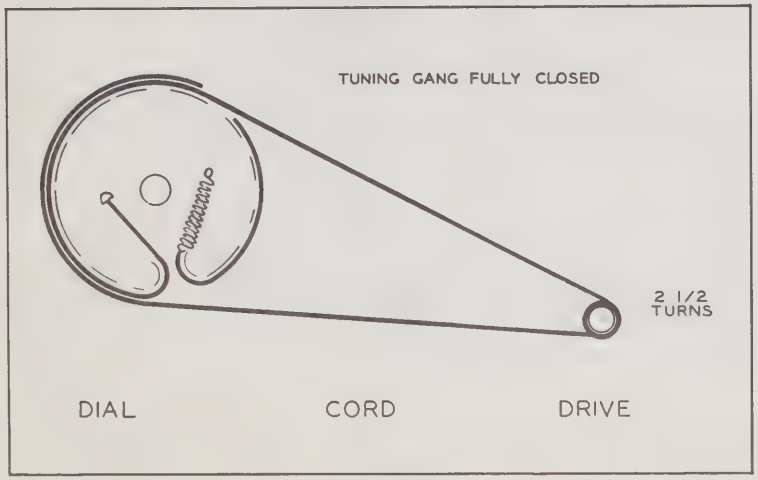
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	GAROD PART No.	MEISSNER PART No.	
36	Loop Ant.	0Ω	1.5Ω	1.421		
37	Osc. Coil	1Ω	8Ω	1.402-1	14-1060*	*Add 50MMFD cap. from high side of tuning cap. to osc. grid.
38	Input IF	43Ω	42Ω	1.259	16-6658	
39	Output IF	43Ω	42Ω	1.259	16-6658	

DIAL LIGHT

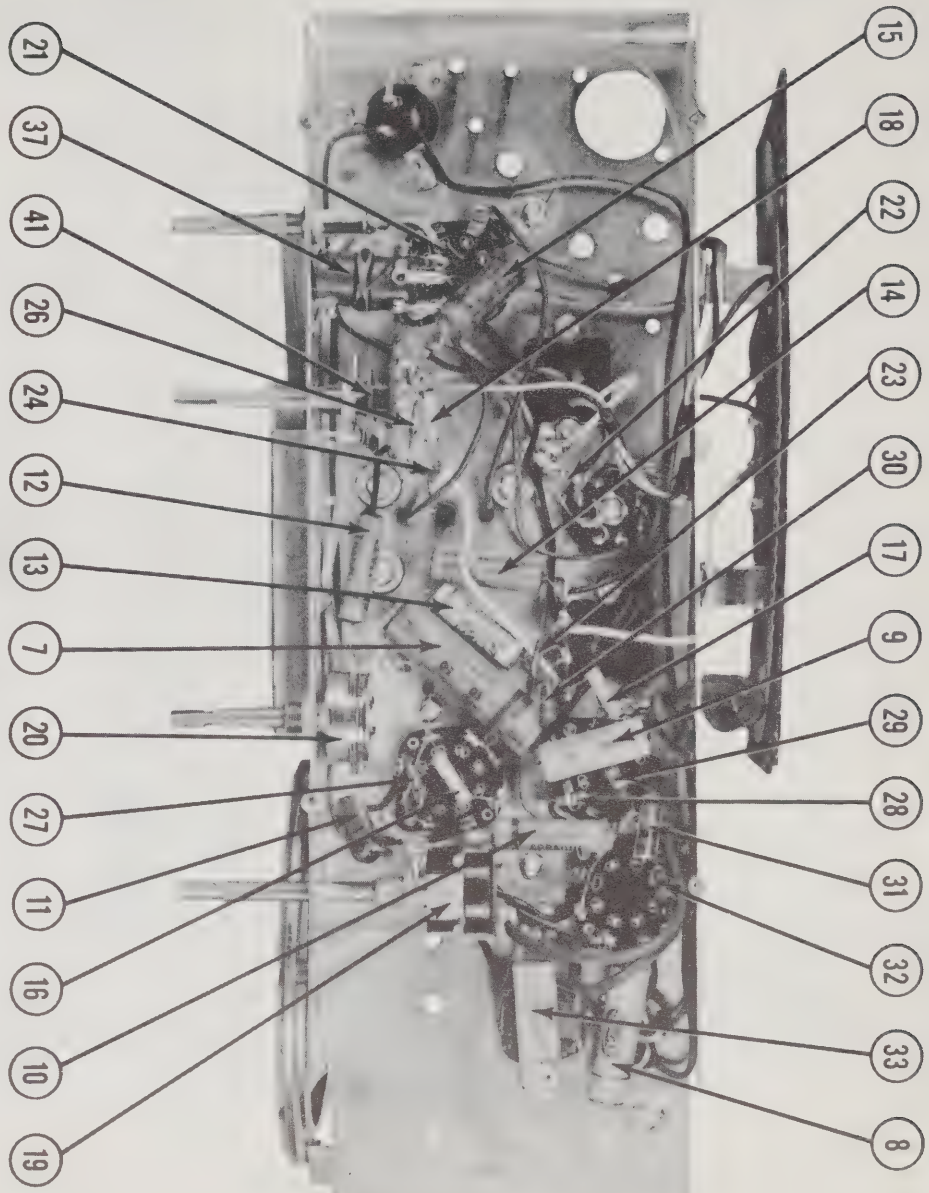
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					GAROD PART No.		
40	Bayonet	6-8	0.15	Brown			Type #47

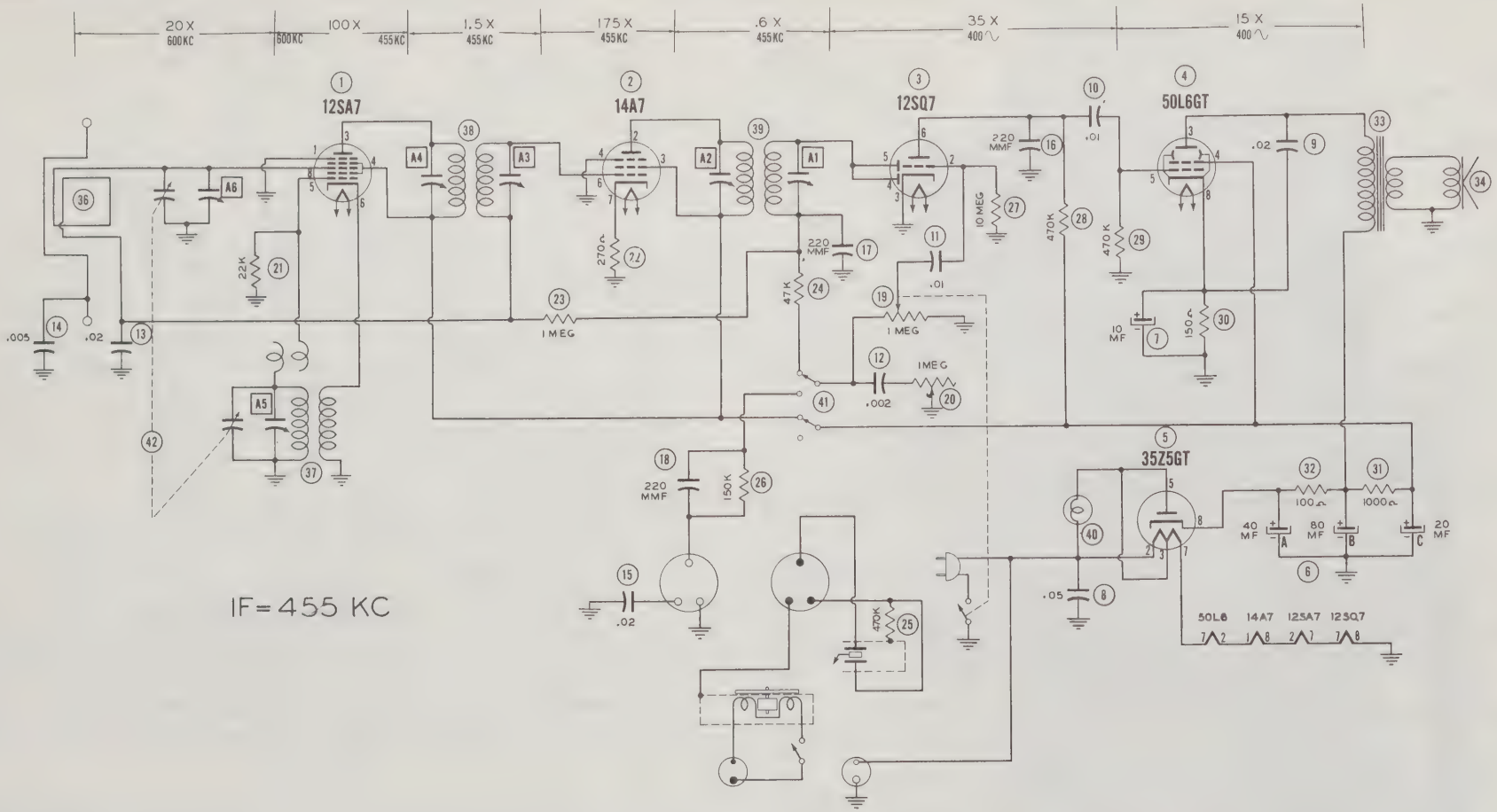
MISCELLANEOUS

ITEM No.	PART NAME	GAROD PART No.	NOTES
41	Switch	11.218	Radio-Phono
42	2 Gang Var. Cap	2.217	(19-382MMF, 26-190MMF)



CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7GT	0V.	26VAC	90VDC	90VDC	-8.5VAC§	0V.	12VAC	-.5VDC
2	14A7	38VAC	90VDC	80VDC	0V.	0V.	-.2VDC	2.6VDC	26VAC
3	12SQ7GT	0V.	-.8VDC	0V.	-.4VDC	-.4VDC	55VDC	12VAC	0V.
4	50L6GT	0V.	38VAC	100VDC	90VDC	0V.	0V.	85VAC	6VDC
5	35Z5GT	0V.	117VAC	113VAC	0V.	113VAC	115VDC	85VAC	115VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7GT	0Ω	29Ω	50KΩ	50KΩ	32KΩ	1Ω	13Ω	2 Meg.
2	14A7	42Ω	50KΩ	50KΩ	0Ω	0Ω	2 Meg.	270Ω	25Ω
3	12SQ7GT	0Ω	10 Meg.	0Ω	1 Meg.	1 Meg.	320KΩ	13Ω	9Ω
4	50L6GT	0Ω	42Ω	50KΩ	50KΩ	470KΩ	INF.	0Ω	190Ω
5	35Z5GT	INF.	110Ω	108Ω	INF.	108Ω	50KΩ	0Ω	50KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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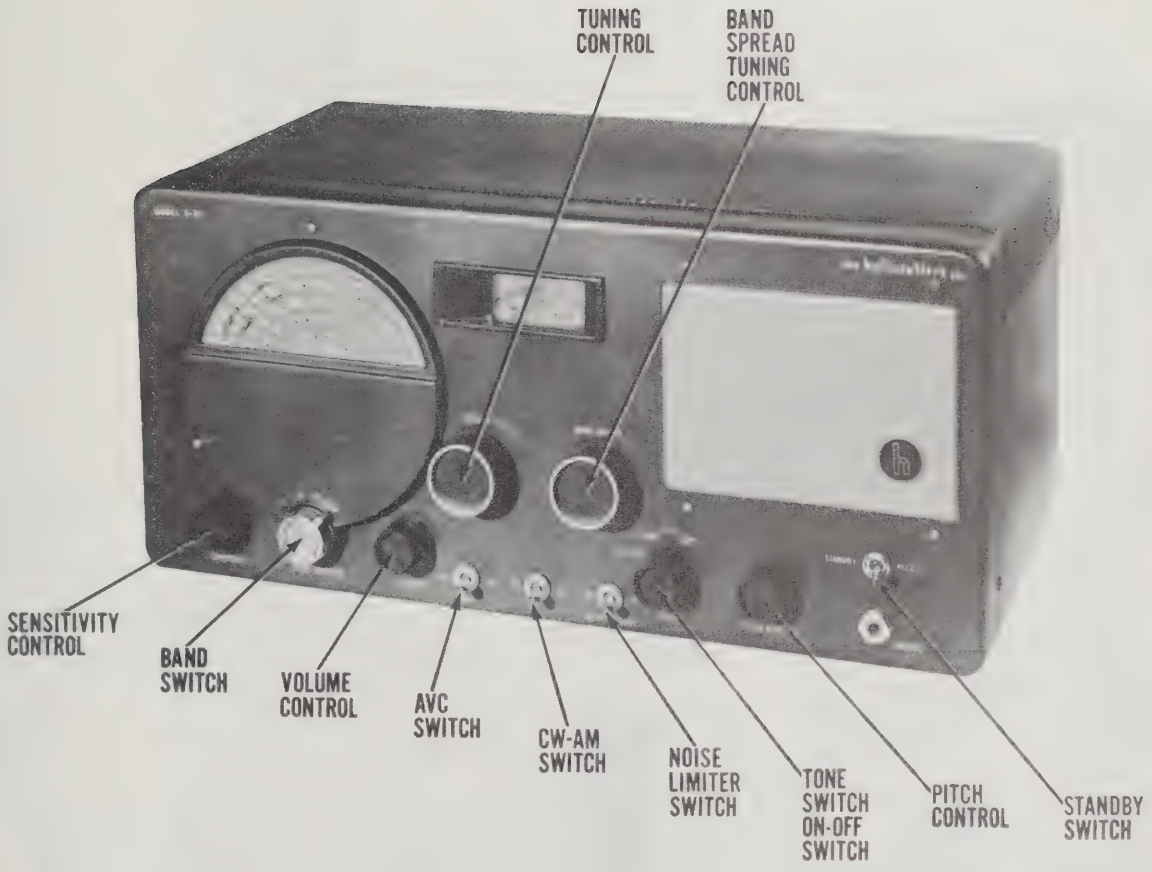
4818-8

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. **DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.**
2. **Socket connections are shown as bottom views.**
3. **Measured values are from socket pin to common negative.**
4. **Line voltage maintained at 117 volts for voltage readings.**
5. **Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.**
6. **Volume control at maximum, no signal applied for voltage measurements.**

HALLICRAFTERS
MODEL S-52



HALLICRAFTERS
MODEL S-52

HALLICRAFTERS MODEL S-52

TRADE NAME	Hallicrafters, Model S-52
MANUFACTURER	Hallicrafters Co., 5th & Kostner Avenues, Chicago 24, Ill.
TYPE SET	AC-DC Operated Multi-Band Commercial Type Superheterodyne Receiver
TUBES (EIGHT)	Types, 6SG7 RF Amp., 6SA7 Converter, 6SK7 1st IF Amp., 6SK7 2nd IF Amp., 6H6 Det.-AVC, 6SC7 AF Amp., 25L6GT Power Output, 25Z6GT Rectifier.
POWER SUPPLY	105-125 Volts AC-DC
RATING	.39 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1680KC SHORT WAVE - Band #2- 1680KC-5.4MC, Band #3- 5.3-15.5MC, Band #4- 15.5-44MC

HOWARD W. SAMS & CO., INC. **Indianapolis Indiana**

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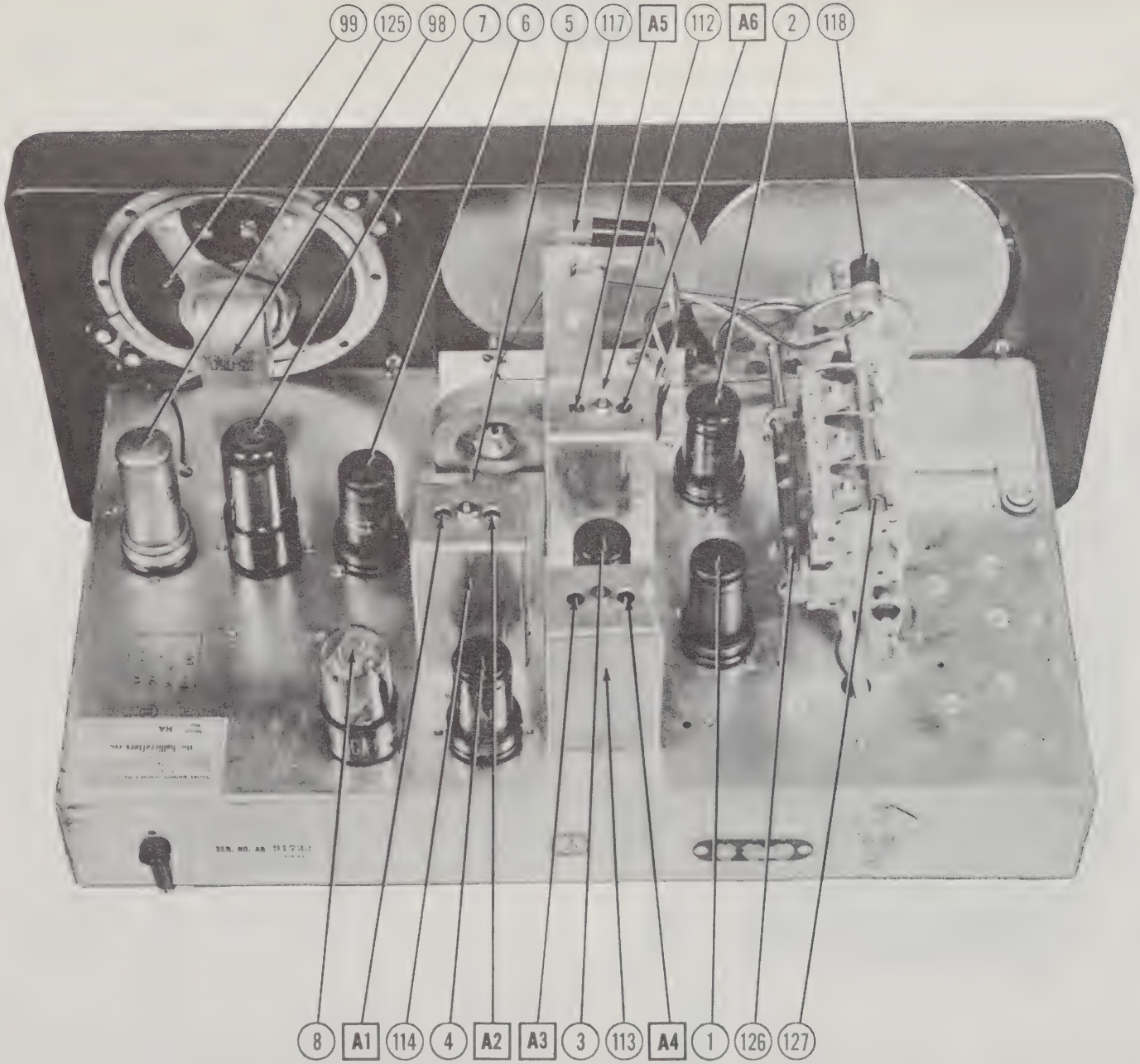
99
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A6
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A1
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A3
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A4
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126
127

20 91 15 42 18 84 16 97 87 88 43 14 10 85 93 94 12 9 13 86
90 21 92 A7 45 76 81 89 22 79 44 73 68 29 116 39 121 65 31 66 11 17 36 30 56 64 35 54 A11 47 111 48 57 A8 119 63 A24 52 53 A17 A23 A20 109 110 A14 A27 108 105 A21 62 A18 50 A25 104 106 A15 A22 101 A26 100 102 A19 A16 49 A12 A9 51 107 37 A13 A10 103 34 58 60 33 59 32 61 69 24 27 28 71 74 23 70 26 124 72 67 121 83 122 82 80 123 77 55 78 41 38 115 120 46 95 19 96 40 75 25

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: HALLICRAFTERS PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.		6SG7	8BK	
2	Converter		6SA7	8R	
3	1st IF		6SK7	8N	
4	2nd IF		6SK7	8N	
5	Det.-AVC		6H6	7Q	
6	AF Amp.		6SC7	8S	
7	Power Output		25L6GT	7AC	
8	Rectifier		25Z6GT	7Q	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: HALLICRAFTERS PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
9A	60	150	45B128	PRSA150/20-20#	EZ42215#	DSB-403020-150#	TA-530	Filter-Red
B	20	150		PRS150/50	BR2015	M-20-150	UT-201	" -Yellow
C	20	150						" -Blue
10	10	25	45A121	PRS25/10	BR102A	M-10-25	TA-10	Output Cathode Byp.
11	10	150	45A097	PRS150/10	BR1215	M-10-150	UT-121	Conv. Screen Decoup.
12	.02	600	46AC203J	684-02	DT6S2	ST-6-02	TC-12	Line Filter
13	.02	600	46A150	684-02	DT6S2	ST-6-02	72P1	Line Isolation
14	.005	600	46AZ502J	684-005	DT6D5	ST-6-005	TC-25	Output Plate Bypass
15	.05	600	46AY503J	684-05	DT6S5	ST-6-05	TC-15	Tone Comp.
16	.01	600	46AZ103J	684-01	DT6S1	ST-6-01	TC-11	Audio Coupling
17	.02	600	46AU203J	684-02	DT6S2	ST-6-02	TC-12	Vol. Control Isolation
18	.003	600	46AZ302J	684-003	DT6D3	ST-6-003	TC-23	Audio Coupling
19	.1	400	46AY104J	484-.1	DT4P1	ST-4-1	TC-1	AF Plate Decoupling
20	.01	600	46AZ103J	684-01	DT6S1	ST-6-01	TC-11	BFO Coupling
21	.05	600	46AY503J	684-05	DT6S5	ST-6-05	TC-15	Limiter Filter
22	.05	200	46AU503J	484-05	DT2S5	ST-4-05	TC-15	Audio Coupling
23	.05	600	46AY503J	684-05	DT6S5	ST-6-05	TC-15	2nd IF Decoupling
24	.02	200	46AU203J	484-02	DT2S2	ST-4-02	TC-12	AVC Filter
25	.02	200	46AU203J	484-02	DT2S2	ST-4-02	TC-12	2nd IF Cath. Bypass
26	.05	600	46AY503J	684-05	DT6S5	ST-6-05	TC-15	1st IF Decoupling
27	.01	600	46AZ103J	684-01	DT6S1	ST-6-01	TC-11	1st IF Cath. Bypass
28	.02	200	46AU203J	484-02	DT2S2	ST-4-02	TC-12	AVC Filter
29	.01	600	46AZ103J	684-01	DT6S1	ST-6-01	TC-11	Conv. Plate Decoupling
30	.003	600	46AZ302J	684-003	DT6D3	ST-6-003	TC-23	Osc. Coupling
31	.005	600	46AZ502J	684-005	DT6D5	ST-6-005	TC-25	Conv. Cathode Bypass
32	.005	600	46AZ502J	684-005	DT6D5	ST-6-005	TC-25	RF Screen Bypass
33	.005	600	46AZ502J	684-005	DT6D5	ST-6-005	TC-25	PF Cathode Bypass
34	.01	600	46AZ103J	684-01	DT6S1	ST-6-01	TC-11	Ext. Gnd. Iso.
35	.01	600	46AZ103J	684-01	DT6S1	ST-6-01	TC-11	Conv. Screen Bypass
36	.05	200	46AU503J	484-05	DT2S5	ST-4-05	TC-15	Conv. Screen Decoup.
37	.05	200	46AU503J	484-05	DT2S5	ST-4-05	TC-15	RF Bypass
38	.02	200	46AU203J	484-02	DT2S2	ST-4-02	TC-12	Audio Coupling
39	.03	600		684-03	DT6S3	ST-6-03	TC-13	Line Isolation-See Note
40	220	500	CM20A221M	1468-0002	5W5T2	MO.5-32	1FM-32	RF Byp. Pwr. Supply
41	100	500	CM20A101M	1468-0001	5W5T1	MO.5-31	1FM-31	Fil. Bypass
42	270	500	CM20A271K	1468-00025	5W5T25	MO.5-325	1FM-325	BFO Grid Cap.
43	220	500	CM20A221M	1468-0002	5W5T2	MO.5-32	1FM-32	AF Plate Bypass
44	47	500	CM20A470M	1468-00005	5W5Q5	MO.5-45	1FM-45	Diode Filter
45	47	500	CM20A470M	1468-00005	5W5Q5	MO.5-45	1FM-45	" "
46	470	500	CM20A471J					Fixed Trimmer
47	270	500	CM20A271K	1468-00025	5W5T25	MO.5-325	1FM-325	Osc. Grid Cap.
48	56	500	CM20A560K	1468-00005	5W5Q5	MO.5-45	1FM-45	RF Coupling
49	24	300	CC21UK240M	1468-000025	5W5Q25	MO.5-425	1FM-425	" " -Cer.
50	15	300	CC21UK150M					" " "
51	82	500	CM20A820K	1468-000075	5W5Q7	MOS.5-47	MS-47	" "
52	1500	300	CM30C152J	1464-0015	1R5D15	MWS.5-215	MS-215	Fixed Pad -Silver
53	3000	300	CM30C302K	1464-003	1R5D3	MWS.5-23	MS-23	" " "
54	68	300	CC25UK680K					Fixed Trimmer-Cer.
55	100	500	CM20A101M	1468-0001	5W5T1	MO.5-31	1FM-31	RF Bypass Pwr. Supply

#Parallel sections to obtain desired capacity.
Note-Not used in all models.

PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	REPLACEMENT DATA: HALLICRAFT. PART No.	REPLACEMENT DATA: MEISSNER PART No.	
	Band					
100	Ant. Coil 1	27.8Ω	0Ω	51B780		
101	" " 2	.4Ω	1.5Ω	51B781		
102	" " 3	.3Ω	.1Ω	51B782		
103	" " 4	.3Ω	0Ω	51B783		
104	RF " 1	.3Ω	5.8Ω	51B784		
105	" " 2		.9Ω	51B785		
106	" " 3	8.1Ω	.2Ω	51B786		
107	" " 4	1.6Ω	0Ω	51B787		
108	Osc. " 1		3.6Ω	51B912		
109	" " 2		1.3Ω	51B789		
110	" " 3		.1Ω	51B913		
111	" " 4	.5Ω	0Ω	51B791		
112	1st IF	14.5Ω	14.3Ω	50C185		
113	2nd IF	12Ω	12Ω	50C186		
114	3rd IF	18.5Ω	18.5Ω	50C192		
115	BF Osc.Coil		17.5Ω	54B033-2		
116	Cath. Chk.		130Ω	53B438		

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: HALLICRAFT. PART No.		INSTALLATION NOTES
117	Bayonet	6-8	0.15	Brown	39A004		Type 47
118	"	6-8	0.15	"	39A004		" "

MISCELLANEOUS

ITEM No.	PART NAME	HALLICRAFTERS PART No.	NOTES
119A	Bandswitch	62B039	Ant. Section
B	"	62B039	RF "
C	"	62B044	Osc. "
120	Switch	60A138	Standby
121	"	60A138	AVC
122	"	60A138	ANL
123	"	60A225	Tone/On-Off
124	"	60A138	CW/AM
125A	Ballast Tube	24B875	110 Volt Operation
B	" "	24B874	220 Volt Operation
126	3 Gang Var. Cap	48C138	Bandspread
127	" " " "		Main Tuning (12-412MMF) each section
	Trimmer	44A149	A8, A9, A10, A15, A16
	"	44A148	A14
	"	44A147	A20, A21, A22, A25, A26
	"	44A191	A24
	Padder	51B912	A27
	Dial	83D240	Main
	"	83B254	Bandspread

PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA HALLICRAFTERS PART No.	REPLACEMENT DATA IRC PART No.	REPLACEMENT DATA CLAROSTAT PART No.	INSTALLATION NOTES
56A	500KΩ	½	25B586	D13-133	M-60-Z	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 56A per instructions
57	10KΩ	½	25B587			Sensitivity Control

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA HALLICRAFTER PART No.	REPLACEMENT DATA IRC PART No.	IDENTIFICATION CODES
58	22Ω	½	RC20AE220M		Red-Red-Blk. Parasitic Supp.
59	120Ω	½	RC20AE121M		Br.-Red-Br. RF Cathode
60	220KΩ	½	RC20AE224M	BTS-220K	Red-Red-Yl. RF Grid
61	1000Ω	½	RC20AE102M	BTS-1000	Br.-Blk.-Red RF Decoup.
62	6800Ω	½	RC20AE682K	BTS-6800	Blue-Gray-Red RF Plate Load
63	10Ω	½	RC20AE100M		Br.-Blk.-Blk. Parasitic Suppressor
64	1000Ω	½	RC20AE102M	BTS-1000	Br.-Blk.-Red Conv. Screen Decoupling
65	18KΩ	½	RC20AE183K	BTS-18K	Br.-Gray-Or. Osc. Grid
66	6.8Ω	½	RC20AE068K		Blue-Gray-Gold Parasitic Suppressor
67	1 Meg.	½	RC20AE105M	BTS-1 Meg.	Br.-Blk.-Grn. Conv. Grid
68	1000Ω	½	RC20AE102K	BTS-1000	Br.-Blk.-Red Conv. Cathode
69	1000Ω	½	RC20AE102M	BTS-1000	Br.-Blk.-Red Conv. Plate Decoup.
70	1000Ω	½	RC20AE102K	BTS-1000	Br.-Blk.-Red 1st IF Cathode
71	1000Ω	½	RC20AE102M	BTS-1000	Br.-Blk.-Red 1st IF Decoup.
72	150Ω	½	RC20AE151M	BW-½-150	Br.-Grn.-Br. AVC Shorting Resistor
73	100KΩ	½	RC20AE104M	BTS-100K	Br.-Blk.-Yl. AVC Network
74	1000Ω	½	RC20AE102K	BTS-1000	Br.-Blk.-Red 2nd IF Cathode
75	1000Ω	½	RC20AE102M	BTS-1000	Br.-Blk.-Red 2nd IF Decoup.
76	47KΩ	½	RC20AE473M	BTS-47K	Yl.-Vi.-Or. Diode Filter
77	100KΩ	½	RC20AE104M	BTS-100K	Br.-Blk.-Yl. Diode Load
78	330KΩ	½	RC20AE334M	BTS-330K	Or.-Or.-Yl. Diode Load
79	2.2 Meg.	½	RC20AE225M	BTS-2.2 Meg.	Red-Red-Grn. AVC Network
80	1 Meg.	½	RC20AE105M	BTS-1 Meg.	Br.-Blk.-Grn. Limiter Network
81	470KΩ	½	RC20AE474M	BTS-470K	Yl.-Vi.-Yl. " "
82	2.2 Meg.	½	RC20AE225M	BTS-2.2 Meg.	Red-Red-Grn. " "
83	110Ω	10	24BG111E	AB-100	Limiter Filament Shunt
84	10 Meg.	½	RC20AE106M	BTS-10 Meg.	Br.-Blk.-Blue 1st AF Grid
85	330KΩ	½	RC20AE334M	BTS-330K	Or.-Or.-Yl. 1st AF Plate Load
86	100KΩ	½	RC20AE104M	BTS-100K	Br.-Blk.-Yl. 1st AF Plate Decoup.
87	470KΩ	½	RC20AE474M	BTS-470K	Yl.-Vi.-Yl. Output Grid
88	150Ω	½	RC20AE151M	BW-½-150	Br.-Grn.-Br. Output Cathode
89	4700Ω	½	RC20AE472M	BTS-4700	Yl.-Vi.-Red Tone Comp.
90	15Ω	1	RC30AE150M	BW-1-15	Br.-Grn.-Blk. Output Transformer Sec. Loading
91	47KΩ	½	RC20AE473M	BTS-47K	Yl.-Vi.-Or. BFO Grid
92	15KΩ	½	RC20AE153M	BTS-15K	Br.-Grn.-Or. BFO Plate
93	1000Ω	½	RC40AE102K	BT-2-1000	Br.-Blk.-Red Filter
94	100Ω	1	RC30AE101K	BW-1-100	Br.-Blk.-Br. "
95	15Ω	½	RC20AE150M	BW-½-15	Br.-Grn.-Blk. Surge Limiter
96	270KΩ	½	RC20AE224M	BTS-270K	Red-Vi.-Yl. Line Isolation

TRANSFORMER (OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA HALLICRAFTERS PART No.	REPLACEMENT DATA STANCOR PART No.	REPLACEMENT DATA THORDAR'N PART No.	REPLACEMENT DATA MERIT PART No.	INSTALLATION NOTES
97	1800Ω	5Ω tapped @ 3.2Ω	180Ω	1.3Ω tapped @ .7Ω	55A110				

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA HALLICRAFTERS PART No.	REPLACEMENT DATA JENSEN PART No.	REPLACEMENT DATA QUAM PART No.	INSTALLATION NOTES
98	FIELD	VC IMP.	85B050	ST-105‡ Mod. P5-X	5A15‡	‡Fabricate new mounting brackets.
	PM	3.2Ω				
99	CONE DIA.	VC DIA.				
	4-3/4"	9/16"				

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

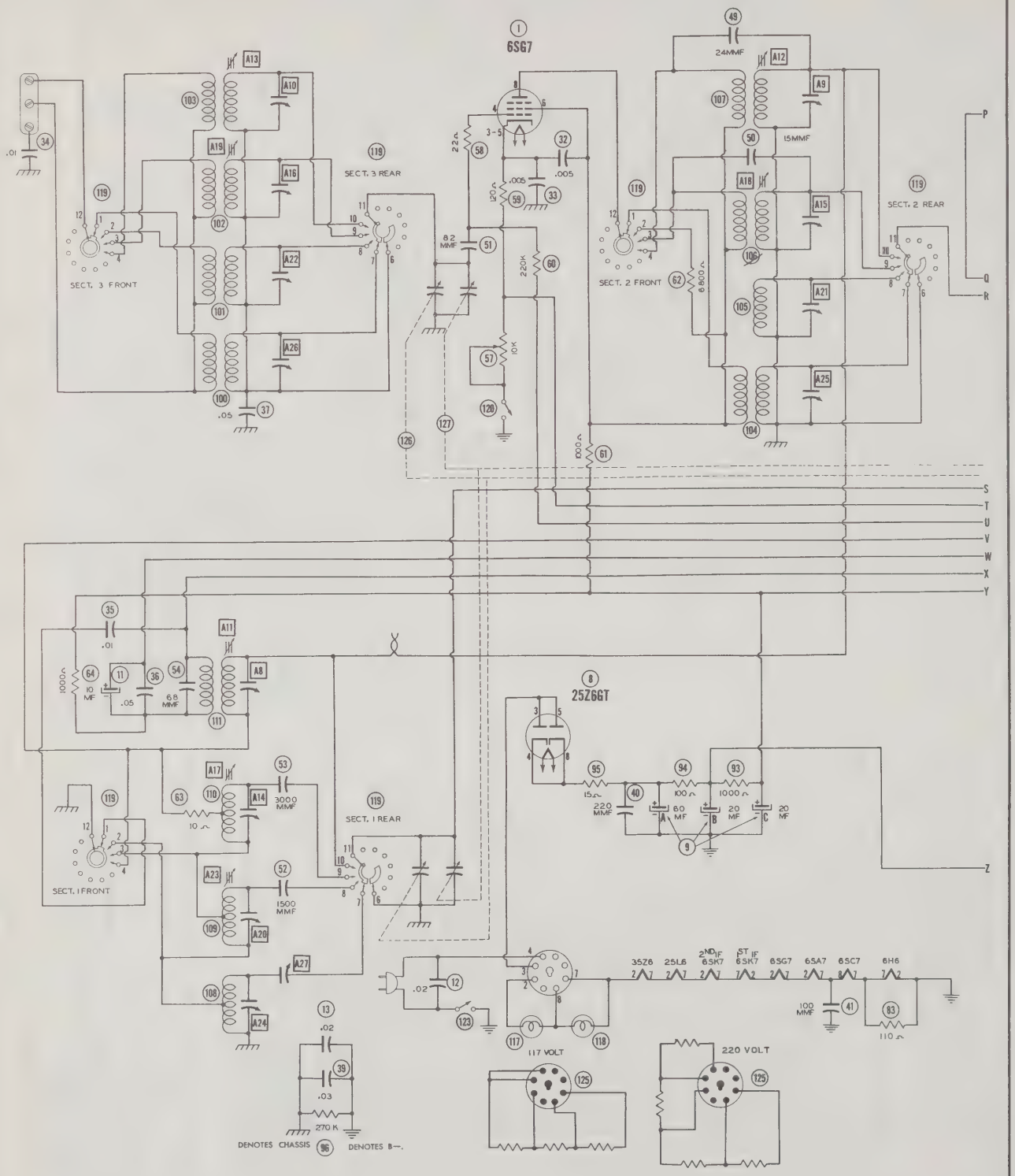
Standard dummy antenna consists of a 200 MMFD cap. In series with a 20 Microhenry RF Choke, the choke being shunted by a 400 MMFD cap. In series with a 400Ω carbon resistor.

To set main tuning dial turn main tuning cap. fully closed and set main dial to "0" on logging scale. To set bandspread dial turn bandspread tuning cap. fully open and set bandspread dial to "0".

Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.

Controls should be set as follows unless otherwise noted: sensitivity at maximum, volume at maximum, AVC switch at OFF, bandspread dial set at zero, CW/AM switch at AM, noise limiter switch at off, standby receive switch at "receive", and tone switch at high. Output of sig. gen. should be no higher than necessary to obtain output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	Direct	High side to center stator of tuning cap. Low side to chassis.	455KC	Band 1	1000KC	Across voice coil	A1,A2, A3,A4, A5,A6	Adjust for maximum output.
2	"	"	455KC (unmodulated)	1	"	"	A7	Set "CW/AM" switch to "CW". Remove the pitch control knob and adjust A7 for maximum output. Replace knob with white dot in top center position.
3	See preliminary notes.	High side to ant. terminal "A1". Low side to "A2" with link connected.	36MC	Band 4	36MC	"	A8	Adjust for maximum output.
4	"	"	"	"	Tune for maximum output.	"	A9,A10	Rock tuning cap. and adjust for maximum output.
5	"	"	12MC	"	12MC	"	A11, A12, A13	Adjust for maximum output. Repeat Steps 3, 4 & 5 until no further improvement can be made.
6	"	"	14MC	Band 3	14MC	"	A14	Adjust for maximum output.
7	"	"	"	"	Tune for maximum output.	"	A15, A16	Rock tuning cap. and adjust for maximum output.
8	"	"	10MC	"	10MC	"	A17, A18, A19	Adjust for maximum output. Repeat Steps 6, 7 & 8 until no further improvement can be made.
9	"	"	5MC	Band 2	5MC	"	A20	Adjust for maximum output.
10	"	"	"	"	Tune for maximum output.	"	A21, A22, A23	Rock tuning cap. and adjust for maximum output.
11	"	"	1.6MC	"	1.6MC	"	A23	Rock tuning cap. and adjust for maximum output. Repeat Steps 9, 10 & 11 until no further improvement can be made.
12	"	"	150KC	Band 1	150KC	"	A24	Adjust for maximum output.
13	"	"	"	"	Tune for maximum output.	"	A25, A26	" " "
14	"	"	600KC	"	600KC	"	A27	Rock tuning cap. and adjust for maximum output. Repeat Steps 12, 13 and 14 until no further improvement can be made.



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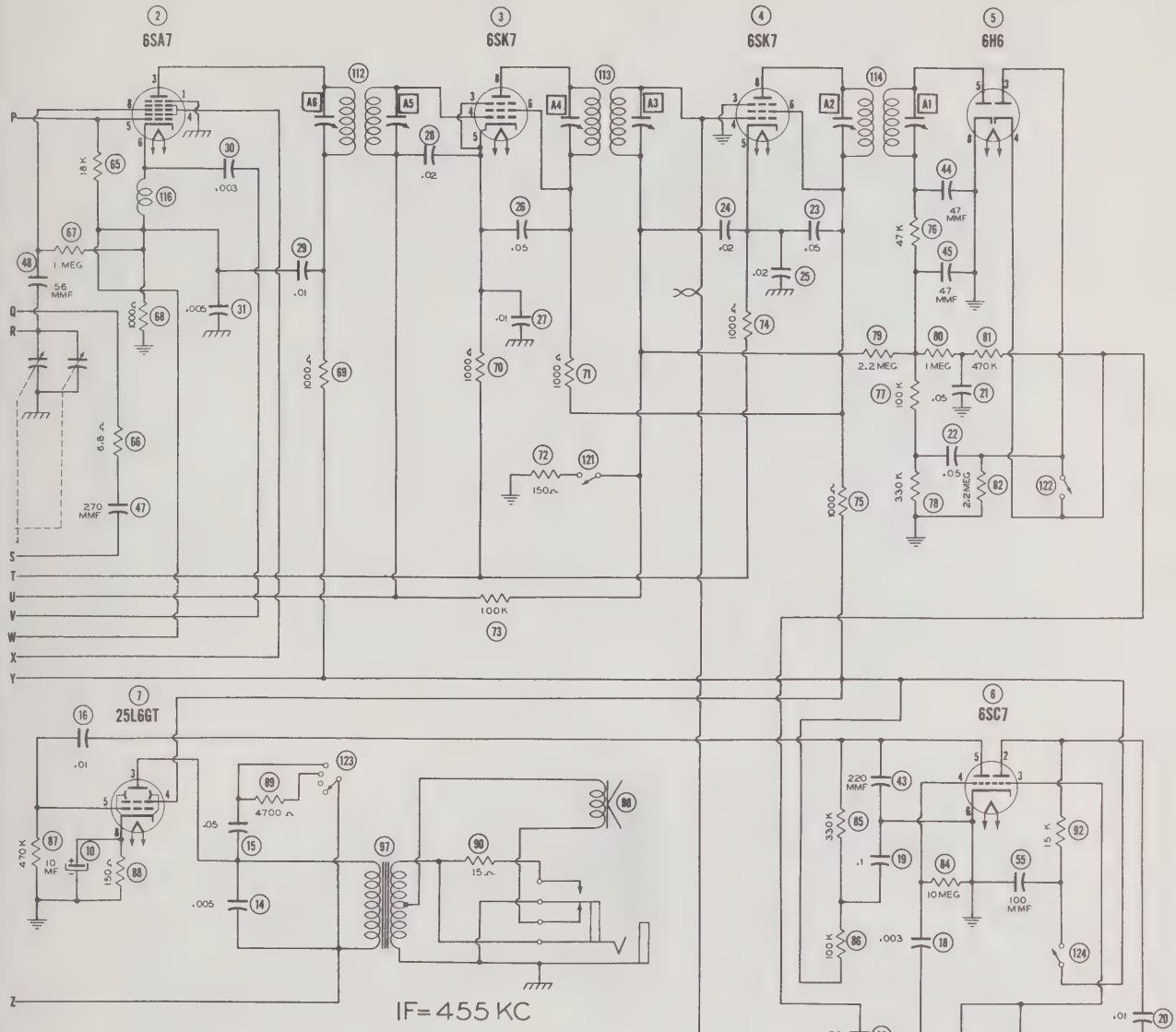

STAGE GAIN MEASUREMENTS		
ANTENNA TO CONVERTER GRID	4X	600KC
CONVERSION GAIN	5X	IN 600KC
		OUT 455KC
1st IF TRANSFORMER	.7X	455KC
1st IF TUBE	50X	455KC
2nd IF TRANSFORMER	.6X	455KC
2nd IF TUBE	70X	455KC
OUTPUT TRANSFORMER	.7X	455KC
AUDIO	25X	400 ∿
OUTPUT	15X	400 ∿

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6SG7	0V.	24VAC	.8VDC	0V.	.8VDC	80VDC	18VAC	80VDC
2	6SA7	0V.	18VAC	85VDC	80VDC	-4.4VDC§	8.8VDC	12VAC	1.2VDC
3	6SK7	0V.	24VAC	3.8VDC	0V.	3.8VDC	75VDC	31VAC	75VDC
4	6SK7	0V.	37VAC	0V.	0V.	4VDC	80VDC	31VAC	80VDC
5	6H6	0V.	0V.	-.1VDC	0V.	-.3VDC	-.4VDC	4.8VAC	0V.
6	6SC7	0V.	80VDC	-1.5VDC§	-.6VDC	50VDC	0V.	4.8VAC	12VAC
7	25L6GT	0V.	60VAC	110VDC	85VDC	0V.	0V.	37VAC	6.5VDC
8	25Z6GT	0V.	85VAC	117VAC	125VDC	117VAC	125VDC	60VAC	125VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

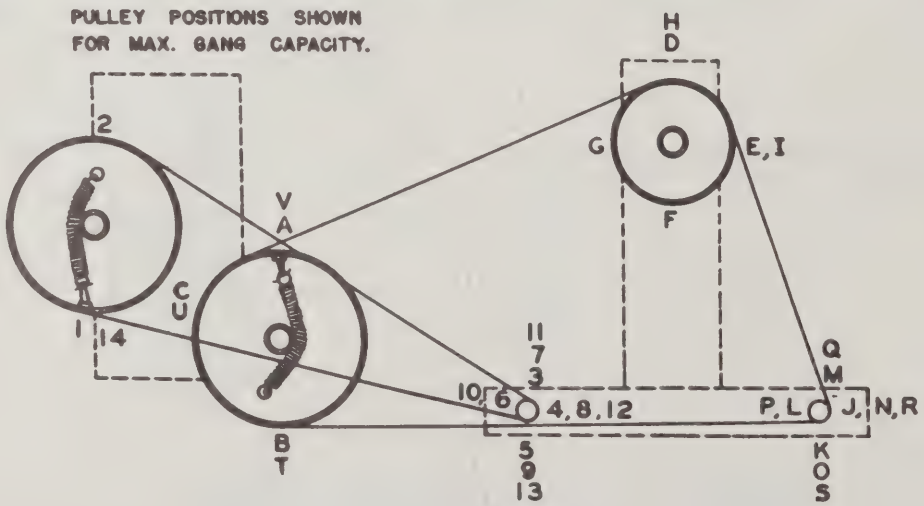
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6SG7	270KΩ	20Ω	120Ω	3 Meg.	120Ω	90KΩ	15Ω	90KΩ
2	6SA7	270KΩ	15Ω	90KΩ	90KΩ	18KΩ	1KΩ	10Ω	1 Meg.
3	6SK7	270KΩ	20Ω	1000Ω	2.7 Meg.	1000Ω	90KΩ	25Ω	90KΩ
4	6SK7	270KΩ	30Ω	270KΩ	2.6 Meg.	1000Ω	90KΩ	2.5Ω	90KΩ
5	6H6	270KΩ	0Ω	2.2 Meg.	2 Meg.	480KΩ	500KΩ	5Ω	0Ω
6	6SC7	270KΩ	105KΩ	47KΩ	10 Meg.	520KΩ	0Ω	5Ω	10Ω
7	25L6GT	INF.	40Ω	90KΩ	90KΩ	470KΩ	0Ω	30Ω	150Ω
8	25Z6GT	INF.	60Ω	130Ω	90KΩ	130Ω	90KΩ	40Ω	90KΩ

TONE CONTROL IN HIGH POSITION. CW AM SWITCH IN SW POSITION FOR TUBE #6 (6SC7).
STANDBY SWITCH IN RECEIVE POSITION. SENSITIVITY CONTROL SET AT MAXIMUM POSITION.
VOLUME CONTROL AT MINIMUM. NOISE LIMITER IN "ON" POSITION. AVC IN "ON""POSITION.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

RESTRINGING DIAL CORD



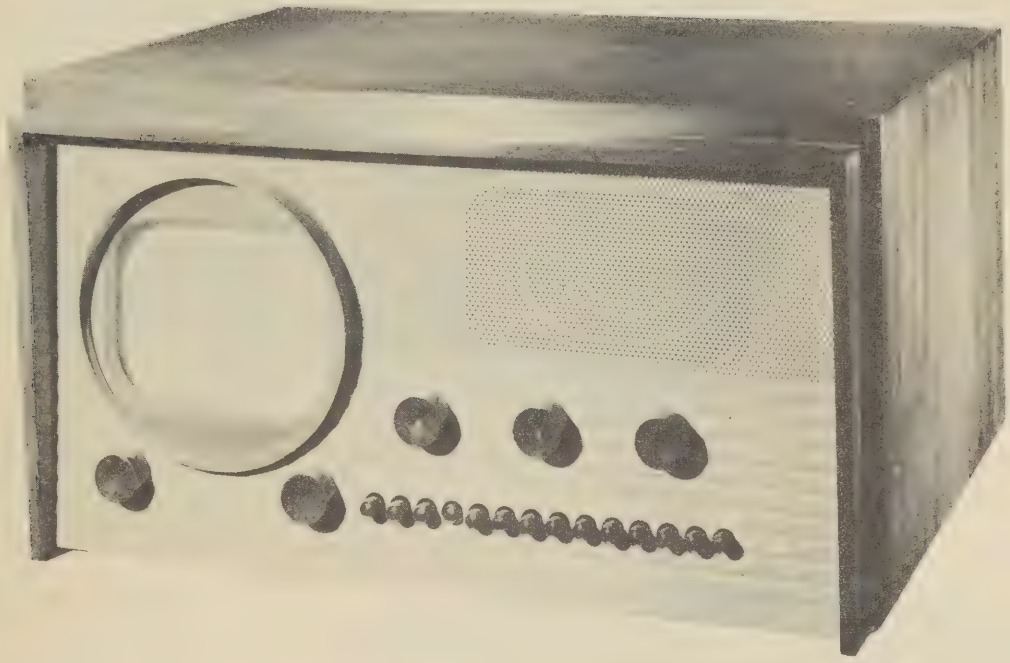
To restring the general coverage tuning dial cord, cut an 18-inch length of 30 lb. test dial cord and tie one end to the tension spring of the main tuning capacitor drive pulley at position "1" on the diagram. Follow the numbers "1" through "14", and at position "14" stretch the tension spring and tie the cord securely.

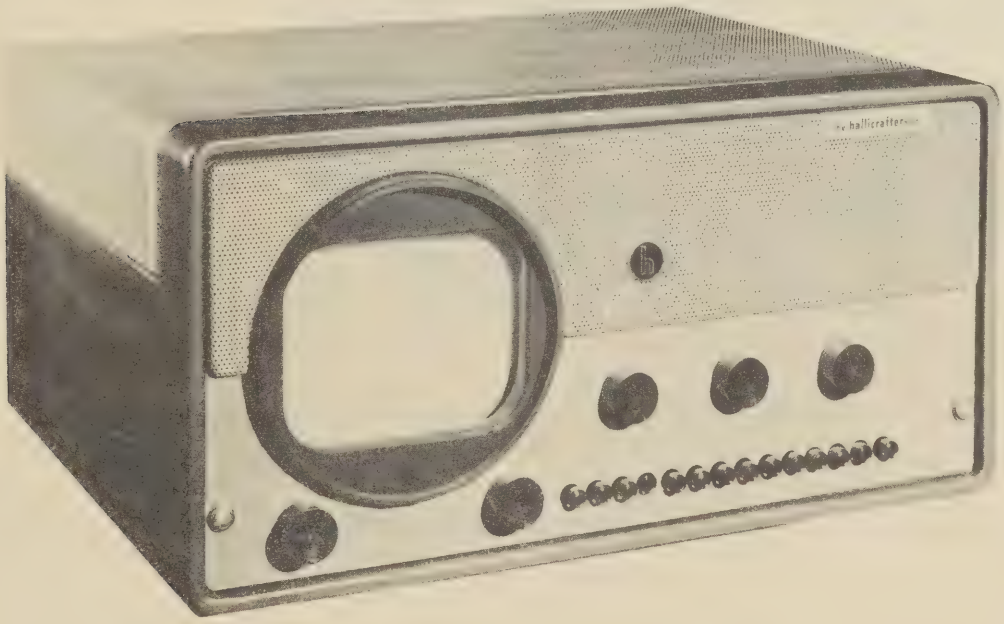
To restring the band spread tuning dial cord, cut a 36-inch length of dial cord and follow the procedure as above, starting at position "A" on the diagram. Note that the tuning drive shafts are wrapped with three turns of dial cord for proper traction.

PHOTOFACT* Folder

*TRADE MARK

HALLICRAFTERS MODELS
T-54, 505





HALLICRAFTERS MODELS
T-54, 505

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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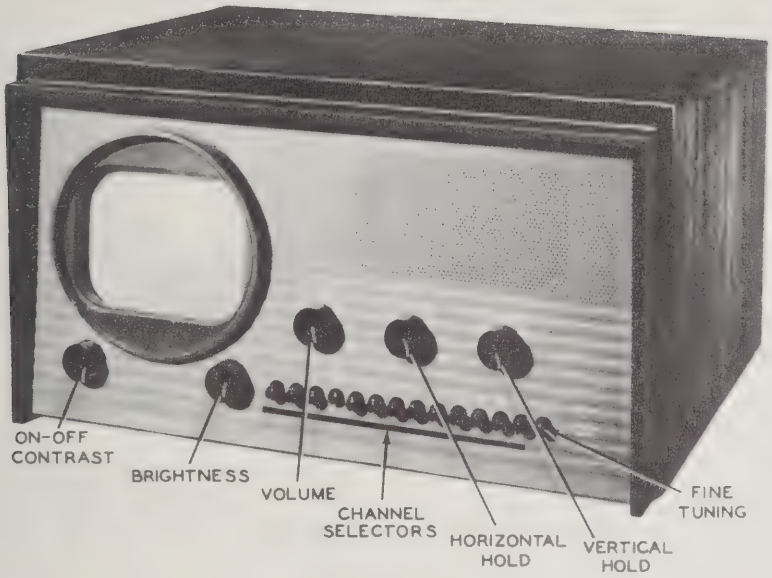
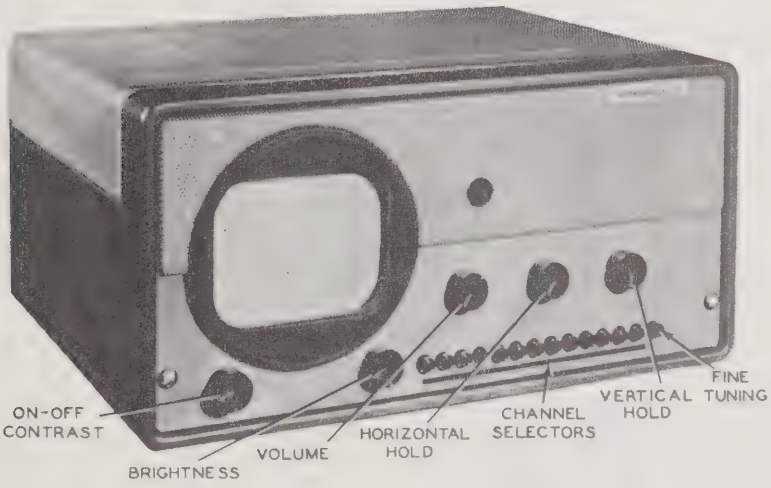
Date 10/48—No. 4818—10 Set No. 48—Folder No. 10





HALLICRAFTERS
MODELS T-54, 505

TRADE NAME	Hallicrafters, Model T-54, 505
MANUFACTURER	The Hallicrafters Co., 4401 W. Fifth Ave., Chicago, Ill.
TYPE SET	Television Receiver
TUBES	Twenty-Two
POWER SUPPLY	105-125 V., 60 Cycles AC RATING 1.15 Amps. @ 117 Volts AC
TUNING RANGE	Complete Thirteen Television Channel Coverage.

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DATE 10/48-#4818-10 SET #48-FOLDER #10

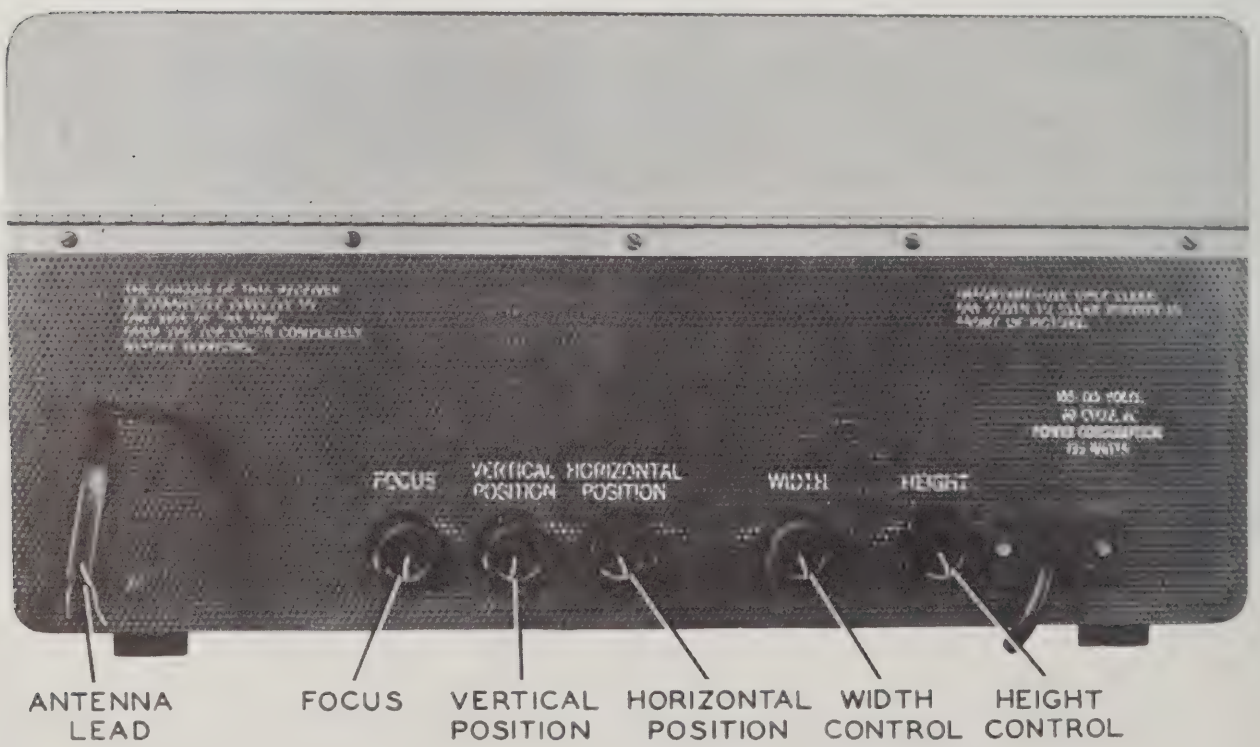
DISASSEMBLY INSTRUCTIONS

MODEL T-54

1. Remove five push-on type knobs.
2. Remove two Phillips screws from front panel.
3. Remove two screws from back side of front panel.
4. Unplug speaker plug.
5. Pull panel forward and remove.
6. Remove picture tube (7JP4) by pulling forward while holding socket.
7. Remove the four chassis mounting screws from bottom.
8. Remove two flat head screws holding interlock socket.
9. Remove two flat head screws holding interlock plug.
10. Lift front edge of chassis and slide out of cabinet.
11. Remove self-tapping screws holding power cord at back of cabinet.
12. CAUTION: DO NOT TIP CHASSIS WITH PICTURE TUBE IN SOCKET WITHOUT FASTENING DOWN THE TUBE. This may be done by wrapping a length of heavy cord or wire around the tube, contrast and brightness controls.

MODEL 505

1. Remove ten screws holding back panel.
2. Remove two screws holding interlock socket.
3. Remove four screws from bottom of cabinet.
4. Unplug speaker plug.
5. Remove five push-on type knobs.
6. Slide chassis out of cabinet.
7. Remove four nuts holding speaker and remove.
8. CAUTION: DO NOT TIP CHASSIS WITH PICTURE TUBE IN SOCKET WITHOUT FASTENING DOWN THE TUBE. This may be done by wrapping a length of heavy cord or wire around the tube, contrast and brightness controls.



REAR PANEL CONTROLS

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: HALLICRAFTERS PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amplifier	90X6AG5	6AG5	7BD	
V2	Mixer	90X6AG5	6AG5	7BD	
V3	Oscillator	90X6C4	6C4	6BG	
V4	1st Video IF Amp.	90X6SH7	6SH7	6BK	
V5	2nd " " "	90X6SH7	6SH7	6BK	
V6	3rd " " "	90X6SH7	6SH7	6BK	
V7	Video Det.	90X6H6	6H6	5AF	
V8	Video Amplifier	90X6SH7	6SH7	6BK	
V9	Video Output, Sync. Sep. & DC Restorer	90X12SN7GT	12SN7GT	8BD	
V10	Sound IF Amp.	90X6SH7	6SH7	6BK	
V11	Ratio Detector	90X6AL5	6AL5	6BT	
V12A	Audio Amp.	90X6SH7	6SH7	6BK	
B	" "	90X6SJ7	6SJ7	8N	Used in late production
V13	Audio Output	90X25L6GT	25L6GT	7A6	
V14	Hor. Oscillator	90X12SN7GT	12SN7GT	8BD	
V15	Hor. Amplifier	90X12SN7GT	12SN7GT	8BD	
V16	Vert. Oscillator	90X12SN7GT	12SN7GT	8BD	
V17	Vert. Amplifier	90X12SN7GT	12SN7GT	8BD	
V18	H.V. Oscillator	90X6C4	6C4	6BG	
V19	H.V. Rectifier	90X1B3GT	1B3GT	3C	
V20	Low V. Rect.	90X[illegible]6GT	2X26GT	7[illegible]	
V21	" " "	90X6X5GT	6X5GT	6S	
V22	Picture Tube	90X7JP4	7JP4	14G	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: HALLICRAFTERS PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	300	45B125				D13145	Red-Filter
B	40	300					" "	
C2A	30	450	45B126		UP3145		D13416	" " -See Note 1
B	15	300						Yellow-Decoup. Filter-See Note 1
C3A	20	250		PRSA250/20-20	BRD2225		AT-261	Decoup. Filter
B	20	250						" "
C4A	30	200	45B123	PRS350/24 (2)	BR3025(2)		D13413	Red-Filter
B	30	200						Blue- "
C5A	100	150	45B124		BR8015(2)		D13414	Red- "
B	100	150						" - "
C6	5	50	45A109	PRS50-10	BR550		TA55	Stabilizing Cap.
C7	5	50	45A109	PRS50-10	BR550		TA55	DC Rest. Cathode Byp.
C8	1000	150	47B20A102N1	1468-001	1W5D1	MW.5-21	1FM-21	Ant. Coup.-Cer.-Note 2
C9	1000	150	47B20A102N1	1468-001	1W5D1	MW.5-21	1FM-21	" " " " 2
C10	47	500	47B20470K5	1468-00005	5W5Q5	MO.5-45	1FM-45	RF Bypass - " " 3
C11	47	500	47B20470K5	1468-00005	5W5Q5	MO.5-45	1FM-45	RF Coupling- "
C12	47	500	47B20470K5	1468-00005	5W5Q5	MO.5-45	1FM-45	" " - "
C13	1000	150	47B20A102N1	1468-001	1W5D1	MW.5-21	1FM-21	AGC Filter - "
C14	1000	150	47B20A102N1	1468-001	1W5D1	MW.5-21	1FM-21	RF Decoupling-Cer.
C15	1.5	500	47A160-3					RF Coupling
C16	39	500	47B20390K5	1468-00004	5W5Q4		1FM-44	RF Coupling-Cer.
C17	4.7	500	47A160-6					Fixed Padder
C18	39	500	47B20390K5	1468-00004	5W5Q4		1FM-44	RF Coupling-Cer.
C19	4.7	500	47A160-6					Fixed Padder
C20	39	500	47B20390K5	1468-00004	5W5Q4		1FM-44	RF Coupling-Cer.
C21	2.2	500	47A160-4					" "
C22	4.7	500	47A160-6					" "
C23	3.3	500	47A160-5					" "
C24	4.7	500	47A160-6					" "
C25	3.3	500	47A160-5					" "
C26	10	500	47A160-11					" "
C27	.68	500	47A160-1					Osc. Coupling
C28	4.7	500	47A160-6					Fixed Padder-See Note 4
C29	1000	150	47B20A102N1	1468_001	1W5D1	MW.5-21	1FM-21	Osc. Plate Byp.-Cer.
C30	1000	150	47B20A102N1	1468-001	1W5D1	MW.5-21	1FM-21	Osc. Decoupling-Cer.
C31	50	500	47B20500K5	1468-00005	5W5Q5	MO.5-45	1FM-45	IF Coupling-Cer.
C32	1000	150	47B20A102N1	1468-001	1W5D1	MW.5-21	1FM-21	Mixer Decoupling-Cer.
C33	1000	150	47B20A102N1	1468-001	1W5D1	MW.5-21	1FM-21	AGC Filter-Cer.

CONTROLS (CONTINUED)

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: HALLICRAFTERS PART No.	CLAROSTAT PART No.	IRC PART No.		NOTES
R6A	5 Meg.	½	25B723		D11-141		Focus Control
B	Shaft				A		
R7A	5 Meg.	¼	25B723		D11-141		Vertical Centering Control
B	Shaft				A		
R8A	5 Meg.	¼	25B723		D11-141		Horizontal Centering Control
B	Shaft				A		
R9A	2.5 Meg.	¼	25B724				Width Control
B	Shaft						
R10A	2.5 Meg.	¼	25B724				Height Control
B	Shaft						

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: HALLICRAFTERS PART No.	IRC PART No.	IDENTIFICATION CODES	
R11	150Ω	½	RC20AE151M		Br.-Grn.-Br. RF Grid	± 10%
R12	150Ω	½	RC20AE151M		Br.-Grn.-Br. RF Cathode	± 10%
R13	2.2 Meg.	½	RC20AE225M	BTS-2.2 Meg.	Red-Red-Grn. AGC Network	± 10%
R14	10KΩ	½	RC20AE103M	BTS-10K	Br.-Blk.-Or. RF Plate Load	± 10%
R15	100Ω	½	RC20AE101M		Br.-Blk.-Br. RF Decoupling	± 10%
R16	1 Meg.	½	RC20AE105M	BTS-1 Meg.	Br.-Blk.-Grn. Mixer Grid	± 10%
R17	2.2 Meg.	½	RC20AE225M	BTS-2.2 Meg.	Red-Red-Grn. A.G.C. Network	± 10%
R18	100Ω	½	RC20AE101M		Br.-Blk.-Br. Osc. Plate	± 10%
R19	22KΩ	½	RC20AE223M	BTS-22K	Red-Red-Or. Osc. Grid	± 10%
R20	27KΩ	½	RC20AE273M	BTS-27K	Red-Vi.-Or. 1st Video IF Grid	± 10%
R21	120KΩ	½	RC20AE124K	BTS-120K	Br.-Red-Yl. AGC Network	± 10%
R22	27KΩ	½	RC20AE273M	BTS-27K	Red-Vi.-Or. 2nd Video IF Grid	± 10%
R23	100Ω	½	RC20AE101M		Br.-Blk.-Br. Decoupling	± 10%
R24	100Ω	½	RC20AE101M		Br.-Blk.-Br. "	± 10%
R25	100Ω	½	RC20AE101M		Br.-Blk.-Br. "	± 10%
R26	27KΩ	½	RC20AE273M	BTS-27K	Red-Vi.-Or. 3rd Video IF Grid	± 10%
R27	120KΩ	½	RC20AE124K	BTS-120K	Br.-Red-Yl. AGC Network	± 10%
R28	560KΩ	½	RC20AE564M	BTS-560K	Grn.-Blue-Yl. AGC Network	± 10%
R29	5600Ω	½	RC20AE562K	BTS-5600Ω	Grn.-Blue-Red Diode Load	± 10%
R30	1 Meg.	½	RC20AE105M	BTS-1 Meg.	Br.-Blk.-Grn. Video Amp. Grid	± 10%
R31	8200Ω	½	RC20AE822M	BTS-8200	Gray-Red-Red Video Amp. Plate	± 10%
R32	1 Meg.	½	RC20AE105M	BTS-1 Meg.	Br.-Blk.-Grn. Video Output Bias Network	± 10%
R33	330KΩ	½	RC20AE334M	BTS-330K	Or.-Or.-Yl. Video Output Grid	± 10%
R34	82KΩ	½	RC20AE823M	BTS-82K	Gray-Red-Or. DC Restorer Plate	± 10%
R35	6800Ω	½	RC20AE682M	BTS-6800	Blue-Gray-Red Video Output Cathode	± 10%
R36	33KΩ	½	RC20AE333M	BTS-33K	Or.-Or.-Or. DC Restorer Cathode	± 10%
R37	330KΩ	½	RC20AE334M	BTS-330K	Or.-Or.-Yl. Sync. Separator Grid	± 10%
R38	5600Ω	½	RC20AE562M	BTS-5600	Grn.-Blue-Red Sync. Separator Grid	± 10%
R39	150KΩ	½	RC20AE154M	BTS-150K	Br.-Grn.-Yl. Picture Tube Cathode	
R40	5600Ω	½	RC20AE562M	BTS-5600	Grn.-Blue-Red Picture Tube Cathode	± 10%
R41	150KΩ	½	RC20AE154M	BTS-150K	Br.-Grn.-Yl. Sound IF Grid	
R42	12KΩ	½	RC20AE123K	BTS-12K	Br.-Red-Or. Sound IF Screen Bleeder	± 10%
R43	33KΩ	½	RC20AE333M	BTS-33K	Or.-Or.-Or. Sound IF Decoupling	± 10%
R44	10KΩ	½	RC20AE103J	BTS-10K-5%	Br.-Blk.-Or. Ratio Det. Load	± 5%
R45	10KΩ	½	RC20AE103J	BTS-10K-5%	Br.-Blk.-Or. " " "	± 5%
R46	33KΩ	½	RC20AE333M	BTS-33K	Or.-Or.-Or. De-emphasis	± 10%
R47	150Ω	½	RC20AE151M	BW-½-150	Br.-Grn.-Br. AF Cathode	± 10%
R48	33KΩ	½	RC20AE333M	BTS-33K	Or.-Or.-Or. Bleeder	± 10%
R49	680KΩ	½	RC20AE684M	BTS-680K	Blue-Gray-Yl. AF Screen	± 10%
R50	100KΩ	½	RC20AE104M	BTS-100K	Br.-Blk.-Yl. AF Plate Load	± 10%
R51	470KΩ	½	RC20AE474M	BTS-470K	Yl.-Vi.-Yl. Output Grid	± 10%
R52	100Ω	1	RC30AE101M	BW-1-100K	Br.-Blk.-Br. Output Cathode	
R53	100KΩ	1	RC30AE104M	BTA-100	Br.-Blk.-Yl. Hor. Osc. Decoupling	± 10%
R54	47KΩ	1	RC30AE473M	BTA-47K	Yl.-Vi.-Or. Hor. Osc. Plate	± 10%
R55	33KΩ	½	RC20AE333M	BTS-33K	Or.-Or.-Or. Hor. Osc. Bias Net.	± 10%
R56	680Ω	1	RC30AE681M	BTA-680	Blue-Gray-Br. Hor. Osc. Cathode	± 10%
R57	270KΩ	½	RC20AE274M	BTS-270K	Red-Vi.-Yl. Hor. Osc. Grid	± 10%
R58	1 Meg.	½	RC20AE105M	BTS-1 Meg.	Br.-Blk.-Grn. Hor. Osc. Plate	± 10%
R59	220KΩ	½	RC20AE224M	BTS-220K	Red-Red-Yl. Bleeder	± 10%
R60	4.7 Meg.	½	RC20AE475M	BTS-4.7 Meg.	Yl.-Vi.-Grn. Hor. Amp. Grid	± 10%
R61	4.7 Meg.	½	RC20AE475M	BTS-4.7 Meg.	Yl.-Vi.-Grn. " " "	± 10%
R62	47KΩ	2	RC40AE473M	BT-2-47K	Yl.-Vi.-Or. Hor. Amp. Plate	± 10%
R63	47KΩ	2	RC40AE473M	BT-2-47K	Yl.-Vi.-Or. " " "	± 10%
R64	33KΩ	½	RC20AE333M	BTS-33K	Or.-Or.-Or. Interstage Network	± 10%
R65	4700Ω	½	[illegible]	BTS-4700	Yl.-Vi.-Red " "	± 10%
R66	470Ω	½	RC20AE471M	BTS-470	Yl.-Vi.-Br. Voltage Divider	± 10%
R67	680Ω	1	RC30AE681M	BTA-680	Blue-Gray-Br. Vert. Osc. Cathode	

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF) CONT.

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA HALLICRAFTERS PART No.	REPLACEMENT DATA MEISSNER PART No.	NOTES
L18	4th IF Coil	.1Ω		50A372		
L19	Video Peaking	9Ω		51A053		Wound on 33KΩ 1 Watt Carbon Resistor
L20	"	11Ω		51A054		" " 1Meg. 1 " " "
L21	"	16Ω		51A055		" " 68KΩ 1 " " "
L22	"	15Ω		51A057		" " 1Meg. 1 " " "
L23	Sound IF Trap	5Ω		51B1037		
L24	Ratio Det. Trans.	5.5Ω	.7Ω	50B406		

COILS (MISC.)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA HALLICRAFTERS PART No.	REPLACEMENT DATA MEISSNER PART No.	NOTES
L25	RF Choke	4Ω		53B008		Red Color Code
L26	" "	4Ω		53B008		" " "
L27	" "	4Ω		53B008		" " "
L28	Sync. Shaping Coil	30Ω		51B1040		Wound on 470Ω 1 Watt carbon resistor
L29A	Osc. Fil. Choke	0Ω		53A133		Dual Winding
B	"	0Ω				
L30A	HV Osc. Choke	36Ω		53A134		Dual Winding
B	"	33Ω				

SPEAKER

ITEM No.	RATING FIELD RES.	RATING V. C. IMP.	REPLACEMENT DATA HALLICRAFTERS PART No.	REPLACEMENT DATA JENSEN PART No.	REPLACEMENT DATA QUAM PART No.	NOTES
SP1	I.M.	3.2Ω	85B070B			
	CONE DIA.	V. C. DIA.				
SP2	5"x7"	1/2"				

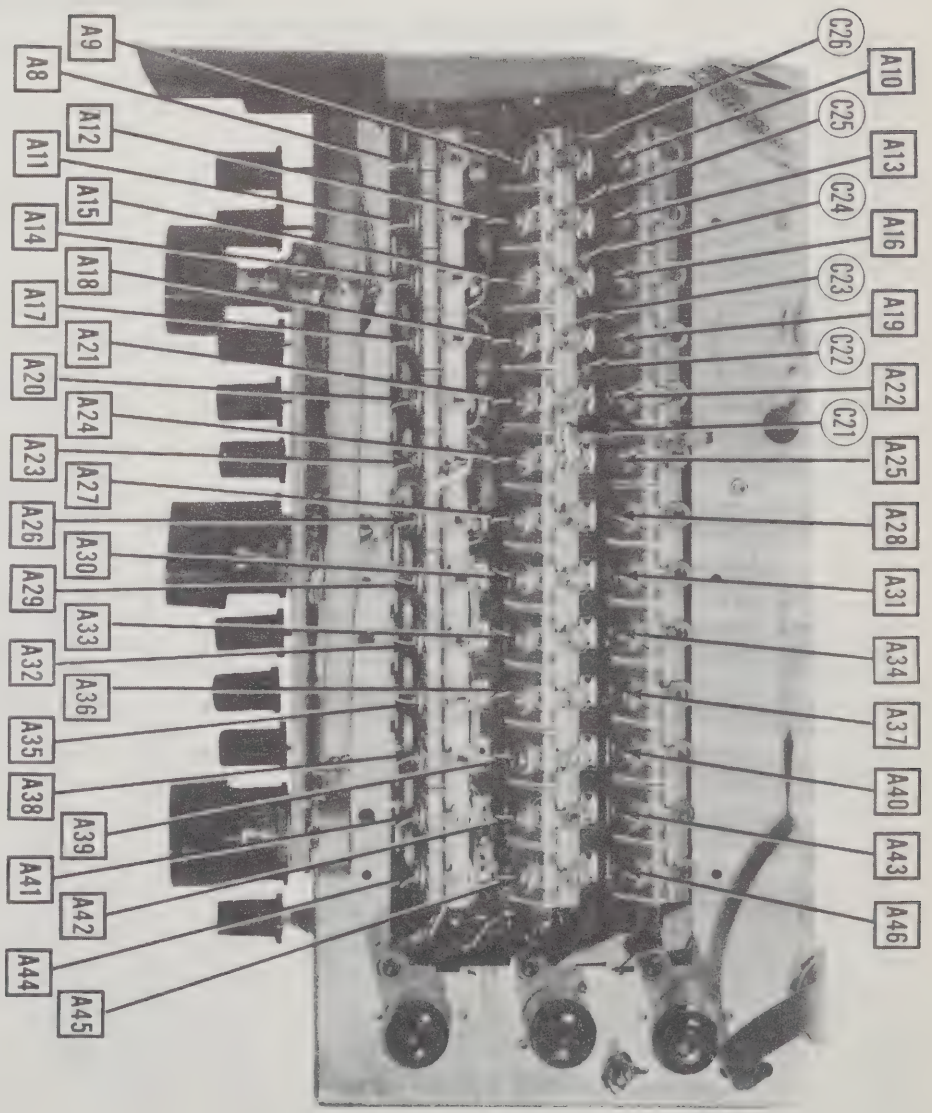
SELENIUM RECTIFIER

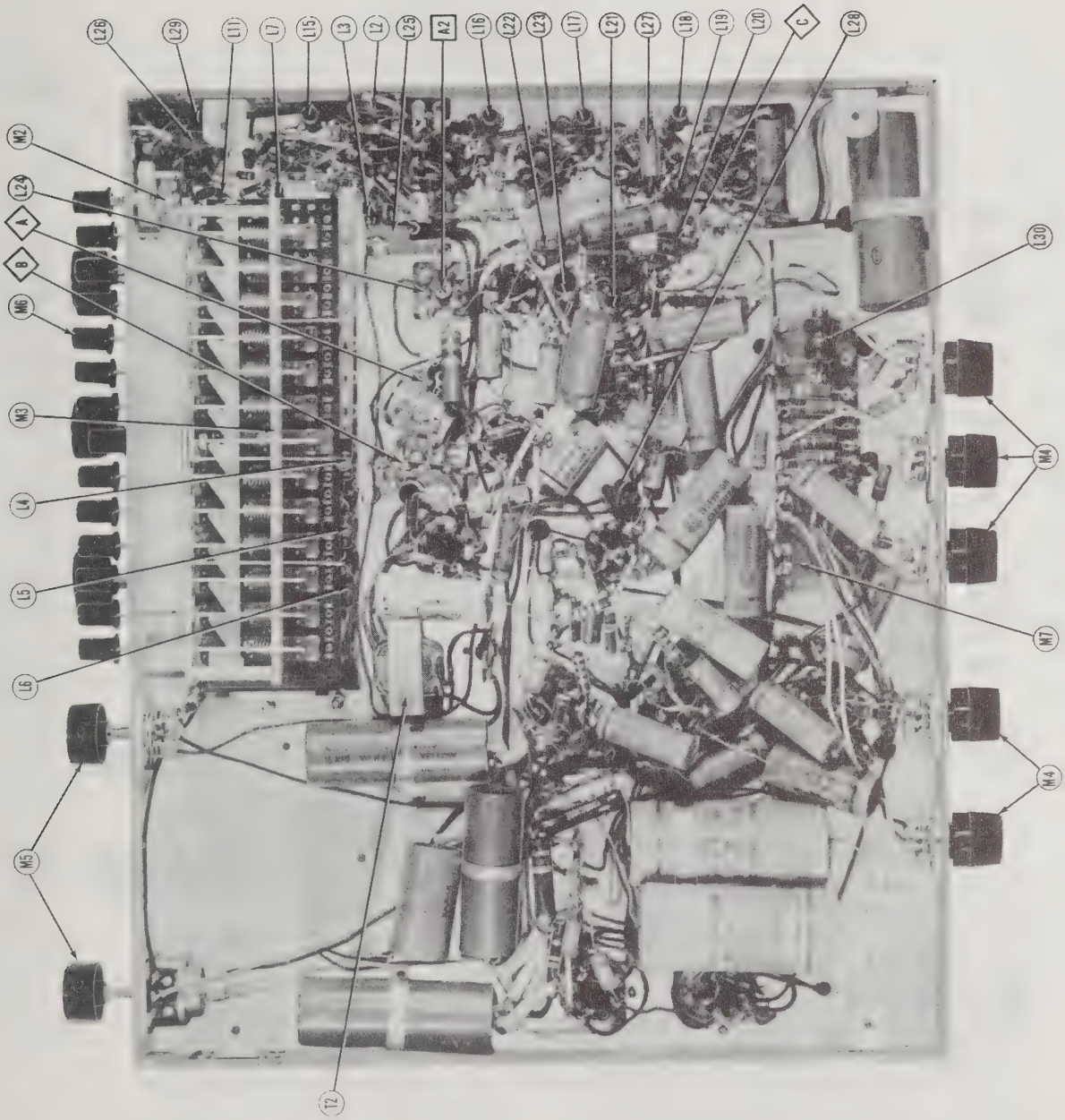
ITEM No.	RATING CURRENT	REPLACEMENT DATA HALLICRAFTERS PART No.			NOTES
M1	165 MA.	27B147			

MISCELLANEOUS

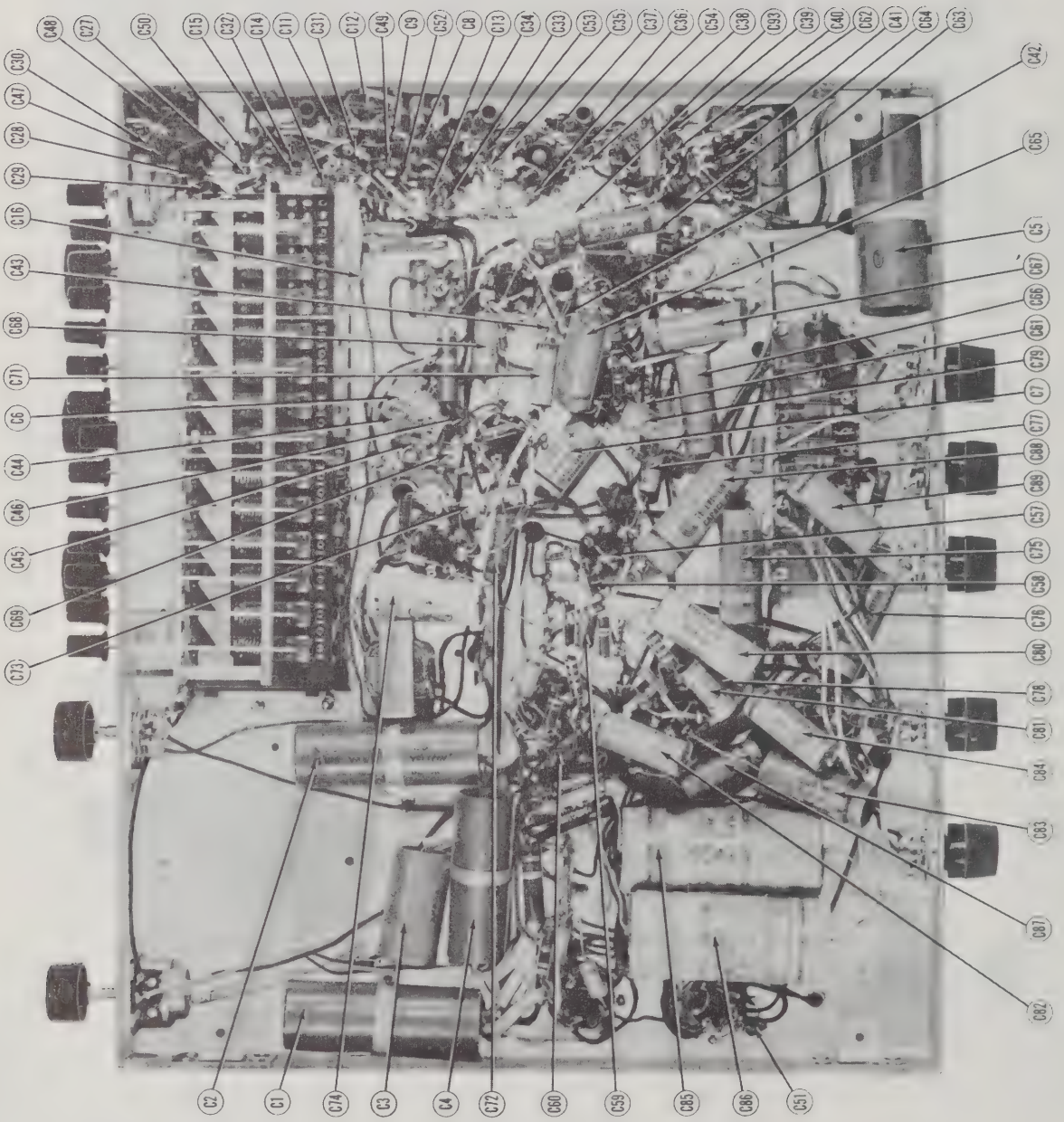
ITEM No.	PART NAME	HALLICRAFTERS PART No.	NOTES
M2	Fine Tuning Capacitor	48A109	
M3	Pushbutton Switch Assy.	60C324	
M4	Rear Panel Knobs	15B141	
M5A	Front Panel Knobs	15B068-4	Model T-54
B	" " "	15B068-3	Model 505
M6A	Pushbutton, Fine Tuning Knob	17A041	Model T-54
B	"	17A041-1	Model 505
M7	Resistor Terminal Board	88A574	
M8A	Line Cord and Plug	87B1668	Model T-54
B	" " " "	87B1668-1	Model 505
	Tube Socket, Octal	6A296	
	" " Miniature	6A297	
	" " Picture Tube	6B298	
	Speaker Baffle	78B314	Model T-54
	Escutcheon, Picture Tube	7D071	Model T-54
	"	7D071-1	Model 505
	Safety Window	22B206	
	Cabinet Back	32D456	Model 505

RF-OSC. ALIGNMENT POINTS

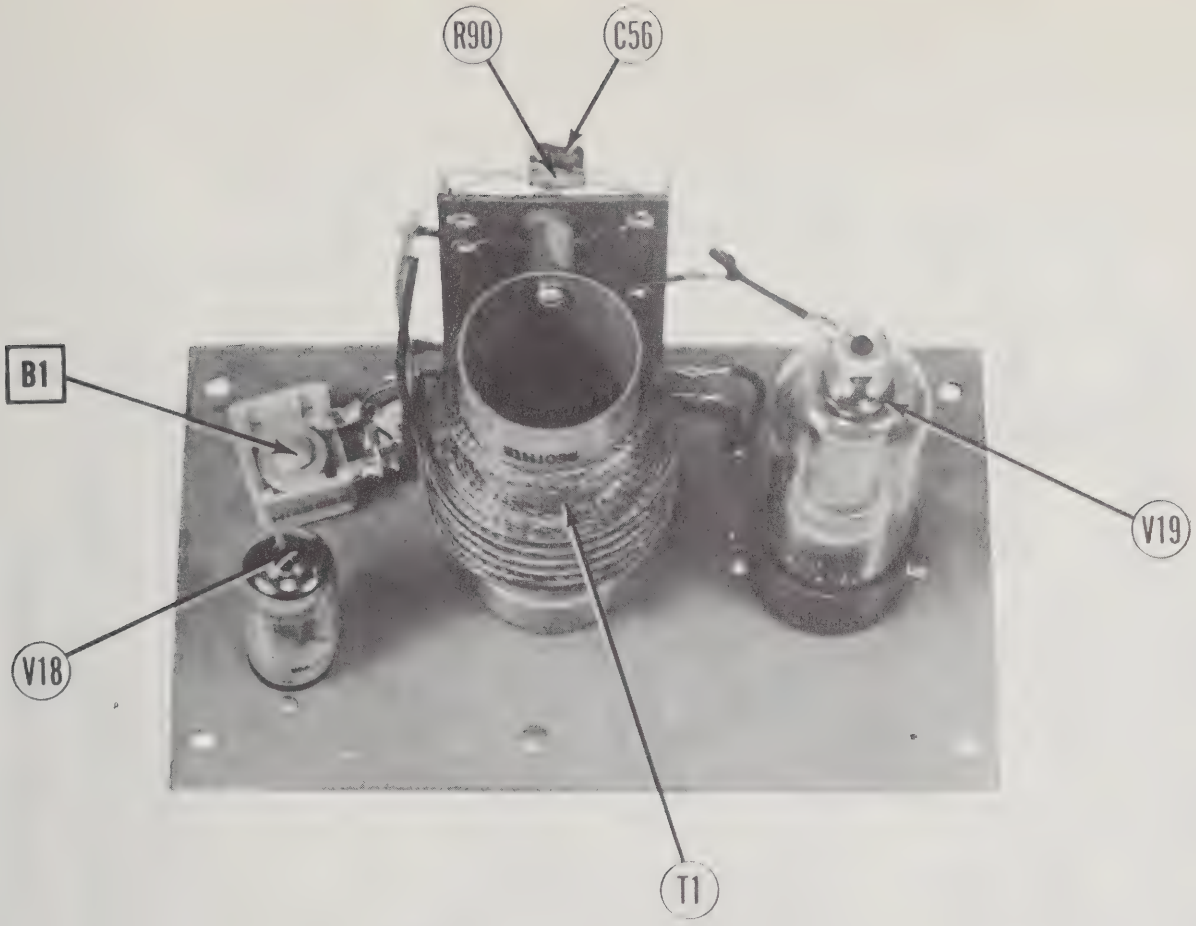




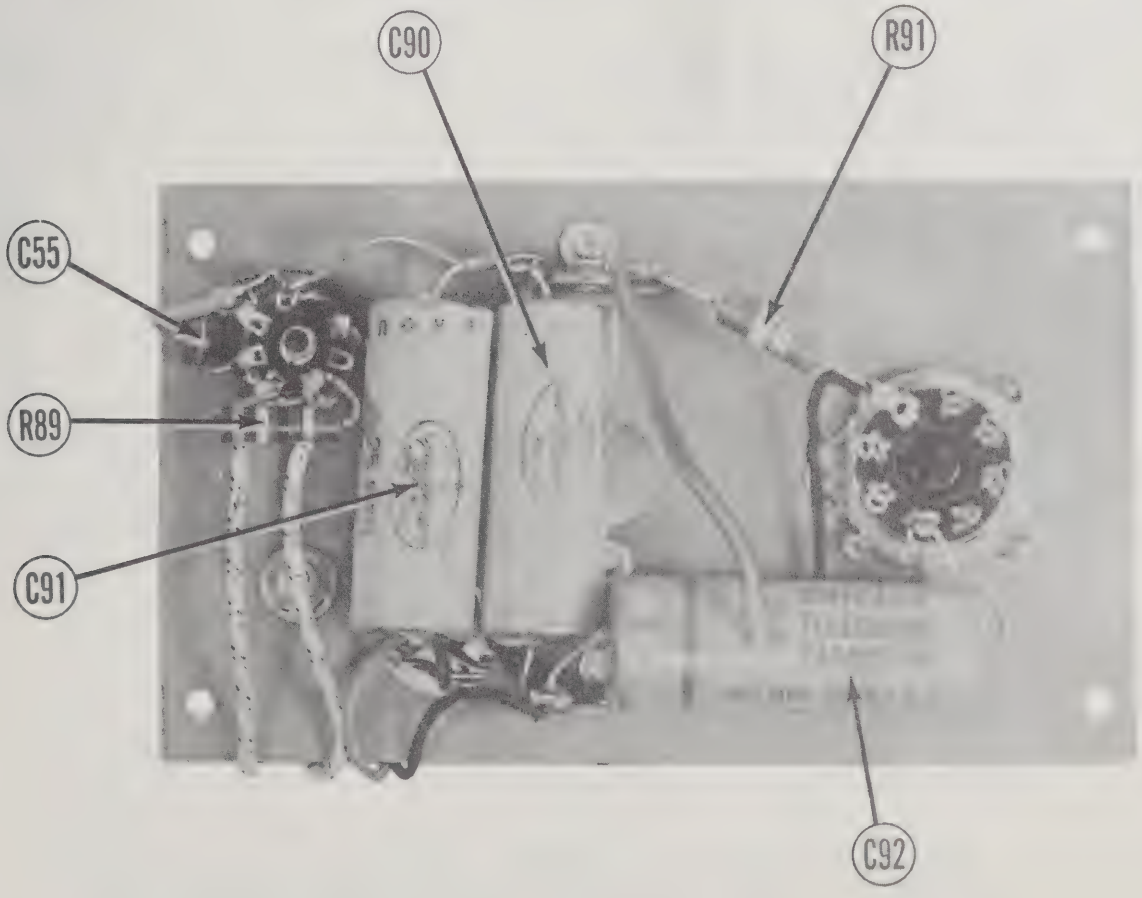
CHASSIS-BOTTOM VIEW-TRANSFORMER, INDUCTOR AND ALIGNMENT POINT IDENTIFICATION



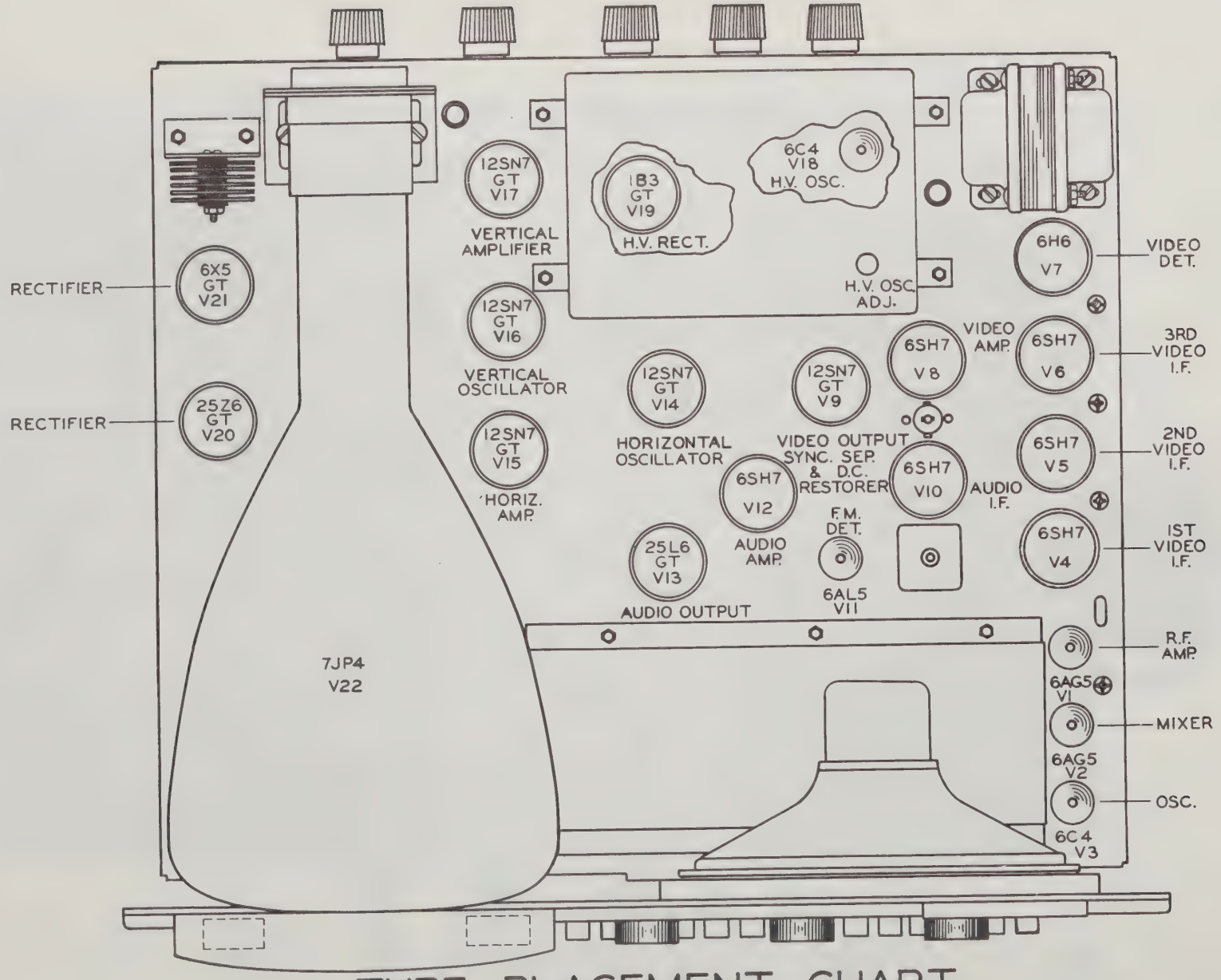
CHASSIS-BOTTOM VIEW-CAPACITOR IDENTIFICATION



RF POWER SUPPLY-TOP VIEW



RF POWER SUPPLY-BOTTOM VIEW



TUBE PLACEMENT CHART

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
V 1	6AG5	-.3VDC	.5VDC	25VAC	19VAC	113VDC	113VDC	.5VDC	-	-
V 2	6AG5	-2VDC	0V.	13VAC	19VAC	113VDC	113VDC	0V.	-	-
V 3	6C4	195VDC	0V.	31VAC	25VAC	195VDC	§	.1VDC	-	-
V 4	6SH7	0V.	19VAC	0V.	-.6VDC	0V.	113VDC	25VAC	113VDC	-
V 5	6SH7	0V.	25VAC	0V.	-.5VDC	0V.	115VDC	31VAC	115VDC	-
V 6	6SH7	0V.	31VAC	0V.	-.2VDC	0V.	118VDC	37VAC	118VDC	-
V 7	6H6	0V.	35VAC	-.4VDC	0V.	-.2VDC	-.3VDC	40.5VAC	0V.	-
V 8	6SH7	0V.	37VAC	0V.	-.3VDC	0V.	117VDC	43VAC	60VDC	-
V 9	12SN7GT	20VDC	117VDC	27VDC	0V.	30VDC	2.2VDC	64VAC	50VAC	-
V 10	6SH7	0V.	43VAC	0V.	-.4VDC	0V.	22VDC	50VAC	22VDC	-
V 11	6AL5	0V.	0V.	31VAC	35VAC	.4VDC	0V.	-.4VDC	-	-
V 12	6SH7	0V.	19VAC	.6VDC	0V.	.6VDC	25VDC	13VAC	85VDC	-
V 13	25L6GT	0V.	78VAC	105VDC	117VDC	0V.	0V.	102VAC	6VDC	-
V 14	12SN7GT	.05VDC	60VDC	1.8VDC	-2VDC	30VDC	1.8VDC	78VAC	64VAC	-
V 15	12SN7GT	-7.5VDC‡	225VDC‡	0V.‡	-6.5VDC‡	250VDC‡	0V‡	70VAC	54VAC	-
V 16	12SN7GT	0V.	65VDC	2.1VDC	-14VDC	60VDC	2.1VDC	54VAC	40.5VAC	-
V 17	12SN7GT	0V.‡	300VDC‡	13VDC‡	0V.‡	300VDC‡	13VDC‡	83VAC	70VAC	-
V 18	6C4	250VDC	102VAC	102VAC	107VAC	250VDC	-49VDC	117VAC	-	-
V 19	1B3GT		DO NOT MEASURE.							
V 20	25Z6GT	0V.	83VAC	-150VDC	117VAC	125VDC	0V.	107VAC	270VDC	-
V 21	6X5GT	0V.	6.3VAC	270VDC	0V.	270VDC	0V.	0V.	410VDC	-

	TUBE	PINS 1	2	3	4	5	6	7	8	9	10	11	12	13	14
V 22	7JP4	6.3VAC	25VDC	2.2VDC	0V.	*	0V.	*	*	*	*	*	0V.	0V.	13VAC

RESISTANCE READINGS

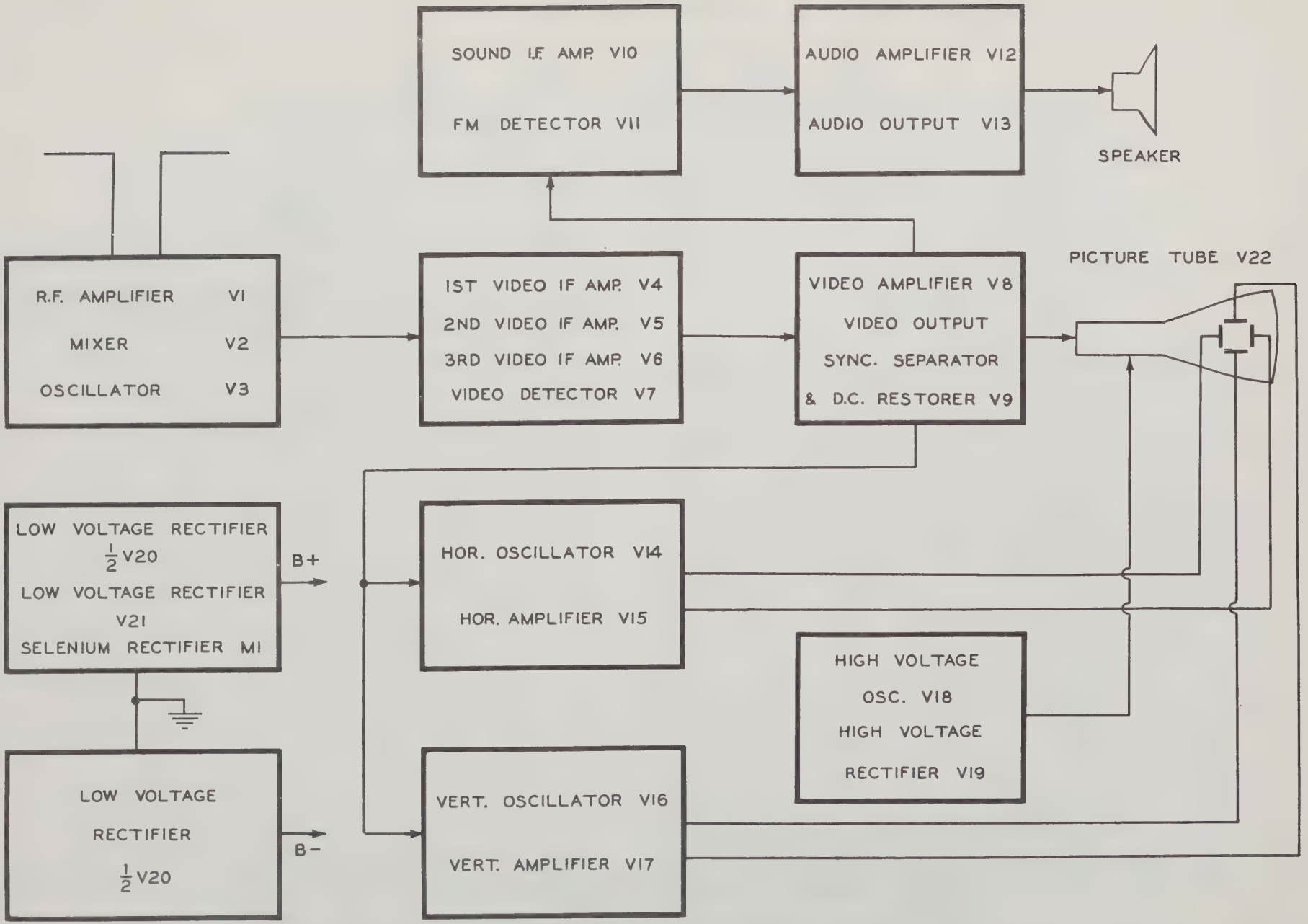
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
V 1	6AG5	1.5 Meg.	150Ω	11Ω	7Ω	300Ω#	400Ω#	150Ω	-	-
V 2	6AG5	1 Meg.	0Ω	3Ω	7Ω	400Ω#	400Ω#	0Ω	-	-
V 3	6C4	4.4KΩ†	INF.	16Ω	11Ω	4.4KΩ†	22KΩ	4Ω	-	-
V 4	6SH7	0Ω	7Ω	0Ω	700KΩ	0Ω	300Ω#	10Ω	300Ω#	-
V 5	6SH7	0Ω	10Ω	0Ω	620KΩ	0Ω	200Ω#	13Ω	200Ω#	-
V 6	6SH7	0Ω	13Ω	0Ω	27KΩ	0Ω	70Ω#	16Ω	70Ω#	-
V 7	6H6	0Ω	20Ω	INF.	0Ω	6KΩ	570KΩ	23Ω	.1Ω	-
V 8	6SH7	0Ω	16Ω	0Ω	1 Meg.	0Ω	70Ω#	19Ω	9KΩ#	-
V 9	12SN7GT	330KΩ	70Ω#	7KΩ	330KΩ	28KΩ#	33KΩ	25Ω	21Ω	-
V 10	6SH7	0Ω	19Ω	0Ω	150KΩ	0Ω	15KΩ#	21Ω	15KΩ#	-
V 11	6AL5	INF.	INF.	16Ω	20Ω	10KΩ	0Ω	10KΩ	-	-
V 12	6SH7	0Ω	7Ω	150Ω	1 Meg.	150Ω	700KΩ#	3Ω	100KΩ#	-
V 13	25L6GT	INF.	29Ω	300Ω#	70Ω#	470KΩ	INF.	33Ω	100Ω	-
V 14	12SN7GT	33Ω	150KΩ§§	700Ω	270KΩ	1 Meg.§§ 2 Meg.§§	700Ω	29Ω	25Ω	-
V 15	12SN7GT	4.7Meg.††	47KΩ§§	1200Ω††	4.7Meg.††	47KΩ§§	1200Ω††	30Ω	27Ω	-
V 16	12SN7GT	5200Ω	150KΩ§§	700Ω	680KΩ	1.5 Meg.§§	700Ω	27Ω	23Ω	-
V 17	12SN7GT	150KΩ††	100KΩ§§	3900Ω††	2.5Meg.‡‡ 1200Ω††	100KΩ§§	3900Ω††	31Ω	30Ω	-
V 18	6C4	700Ω†	33Ω	33Ω	33Ω	700Ω†	56000Ω‡	40Ω‡	-	-
V 19	1B3GT	INF.	INF.	INF.	INF.	INF.	INF.	INF.	INF.	320Ω
V 20	25Z6GT	INF.	31Ω	150KΩ	55Ω	10KΩ	INF.	33Ω	500KΩ	-
V 21	6X5GT	INF	1.5Ω	500KΩ	INF.	500KΩ	INF.	0Ω	1.5 Meg.	-

	TUBE	PINS 1	2	3	4	5	6	7	8	9	10	11	12	13	14
V 22	7JP4	1.5Ω	160KΩ	33KΩ	INF.	8 Meg.	INF.	INF.	INF.	INF.	INF.	INF.	INF.	INF.	3Ω

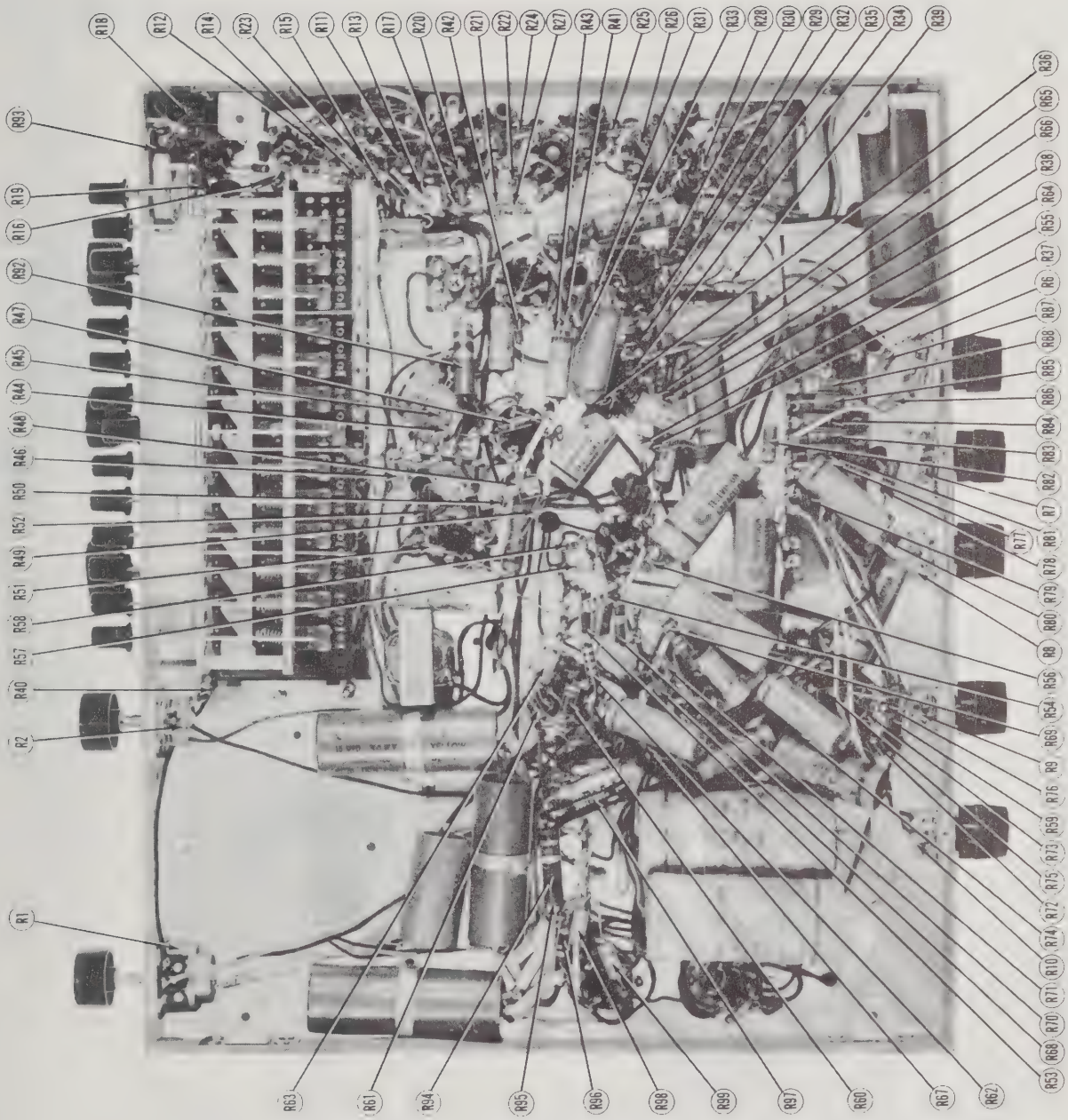
§Any change in capacity in the oscillator circuit such as the connection of a test probe may stop oscillations. If a negative reading is not obtained on the grid with a channel button depressed check for oscillations as follows. Measure the plate voltage of the oscillator tube with any channel button depressed. Release the channel button (all buttons out) and the oscillator plate voltage should drop approximately 25 volts. If there is no drop in voltage the oscillator is not operating.
‡Measured from Pin #3 of V15.
*DO NOT MEASURE. Accurate measure cannot be made due to the high impedance of the circuit. Make an overall measurement as described under high voltage oscillator adjustment.

† Measured from Pin #8 of V20.
♠ Measured from Pin #4 of V20.
Measured from Pin #5 of V20.
§§ Measured from Pin #8 of V21.
†† Measured from Pin #3 of V20.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at maximum.
6. Where readings may vary according to the setting of the rear panel controls, both minimum and maximum readings are given.



BLOCK DIAGRAM



CHASSIS-BOTTOM VIEW-RESISTOR IDENTIFICATION

SOUND IF ALIGNMENT

The high voltage oscillator may be disabled during alignment by replacing V18 with a 6C4 having Pin 7 bent out at right angles. Do not attempt to operate receiver with V18 removed. Use an isolation transformer if available.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1	.01 MFD.	High side to Pin 4 (grid) of video amp. V-8. Low side to chassis.	4.5MC (Unmodulated)	1	DC probe to pin 7 of FM Det. 6AL5 (V-11) (Point A). Common to chassis.	A1,A2 (A2 is on bottom of L-24).	Adjust for maximum deflection. Attenuate signal to give reading of approx. 1 volt.
2	.01 MFD.	"	"	1	DC probe to Point B. (Across C-45). Common to chassis.	A3	Adjust for zero reading. Shift generator frequency above and below 4.5MC and readjust A2 (if necessary) for equal peak readings. Attenuate signal to give approximately one volt peaks.

VIDEO IF ALIGNMENT

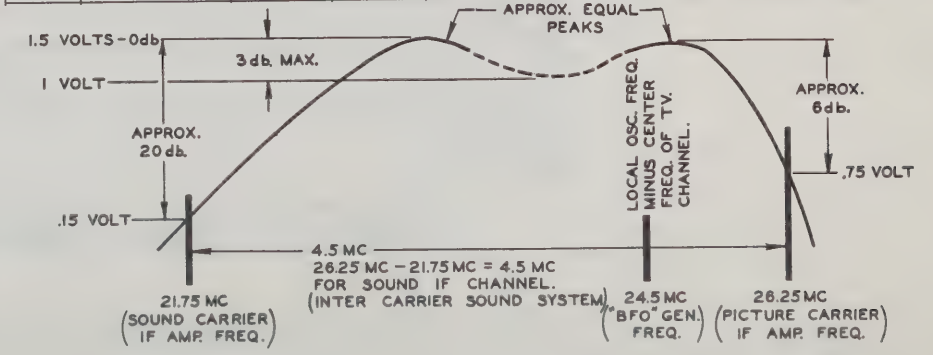
In Steps 3, 4, 5, 6, and 7 the oscillator is disabled to prevent any spurious beats which might result in improper alignment. Immediately after Step 7 depress channel #1 button to start the oscillator as some resistors dissipate more heat than normal when the oscillator is disabled.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
3	2 - 150Ω carbon resistors.	Connect signal gen. to antenna with 150Ω in series with each lead.	24MC (Unmodulated)	Trigger out all buttons to disable osc.	DC probe to Point C (across R-29). Common to chassis.	A4	Adjust for maximum deflection. Attenuate signal to give approximately one volt reading.
4	"	"	25MC (Unmodulated)	"	"	A5	"
5	"	"	23MC (Unmodulated)	"	"	A6	"
6	"	"	26MC (Unmodulated)	"	"	A7	"
7	"	"	Tune gen. from 21MC through 26.25MC.	"	"	A5	Attenuate signal to give a 1½ volt reading at the peaks. Plot IF response curve. Check readings at 21.75MC, 26.25MC and dip between the peaks. Correct response curve is given in Fig. 1.

RF ALIGNMENT

The local oscillator operates 24.5MC above the center frequency of each TV channel. To set the local oscillator a separate "BFO" generator set at 24.5MC is used to obtain a zero beat with this difference frequency. Couple the "BFO" generator to receiver by placing the output lead near the video detector tube V-7. Set fine tuning control at center of its capacity range.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BFO GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
8	2 - 150Ω carbon resistors.	Connect signal generator to antenna with 150Ω in series with each lead.	47MC (Unmodulated)	24.5MC (Unmodulated)	1		A8	Connect a .01 MFD. capacitor between Pin 3 of V-9 and Pin 4 of V-12. Adjust A8 for rough audio beat note in speaker. Remove .01 MFD. capacitor.
9	"	"	"	Off	1	DC probe to Point C. Common to chassis.	A9,A10	Adjust for maximum deflection.
10	"	"	57MC	24.5MC	2	"	A11	Reconnect .01 MFD. cap. as in Step 8. Adjust for beat note. Remove .01 MFD. cap.
11	"	"	"	Off	2	"	A12,A13	Adjust for maximum deflection.
12	"	"	63MC	24.5MC	3	"	A14	Reconnect .01 MFD. cap. as in Step 8. Adjust for beat note. Remove .01 MFD. cap.
13	"	"	"	Off	3	"	A15,A16	Adjust for maximum deflection.
14	"	"	69MC	24.5MC	4	"	A17	Reconnect .01 MFD. cap. as in Step 8. Adjust for beat note. Remove .01 MFD. cap.
15	"	"	"	Off	4	"	A18,A19	Adjust for maximum deflection.
16	"	"	79MC	24.5MC	5	"	A20	Reconnect .01 MFD. cap. as in Step 8. Adjust for beat note. Remove .01 MFD. cap.
17	"	"	"	Off	5	"	A21,A22	Adjust for maximum deflection.
18	"	"	85MC	24.5MC	6	"	A23	Reconnect .01 MFD. cap. as in Step 8. Adjust for beat note. Remove .01 MFD. cap.
19	"	"	"	Off	6	"	A24,A25	Adjust for maximum deflection.
20	"	"	177MC	24.5MC	7	"	A26	Reconnect .01 MFD. cap. as in Step 8. Adjust for beat note. Remove .01 MFD. cap.
21	"	"	"	Off	7	"	A27,A28	Adjust for maximum deflection.
22	"	"	183MC	24.5MC	8	"	A29	Reconnect .01 MFD. cap. as in Step 8. Adjust for beat note. Remove .01 MFD. cap.
23	"	"	"	Off	8	"	A30,A31	Adjust for maximum deflection.
24	"	"	189MC	24.5MC	9	"	A32	Reconnect .01 MFD. cap. as in Step 8. Adjust for beat note. Remove .01 MFD. cap.
25	"	"	"	Off	9	"	A33,A34	Adjust for maximum deflection.
26	"	"	195MC	24.5MC	10	"	A35	Reconnect .01 MFD. cap. as in Step 8. Adjust for beat note. Remove .01 MFD. cap.
27	"	"	"	Off	10	"	A36,A37	Adjust for maximum deflection.
28	"	"	201MC	24.5MC	11	"	A38	Reconnect .01 MFD. cap. as in Step 8. Adjust for beat note. Remove .01 MFD cap.
29	"	"	"	Off	11	"	A39,A40	Adjust for maximum deflection.
30	"	"	207MC	24.5MC	12	"	A41	Reconnect .01 MFD. cap. as in Step 8. Adjust for beat note. Remove .01 MFD. cap.
31	"	"	"	Off	12	"	A42,A43	Adjust for maximum deflection.
32	"	"	213MC	24.5MC	13	"	A44	Reconnect .01 MFD. cap. as in Step 8. Adjust for beat note. Remove .01 MFD. cap.
33	"	"	"	Off	13	"	A45,A46	Adjust for maximum deflection.


1.5 VOLTS - 0db
1 VOLT
APPROX. 20db.
.15 VOLT
3db. MAX.
APPROX. EQUAL PEAKS
APPROX. 6db.
.75 VOLT
LOCAL OSC. FREQ. MINUS CENTER FREQ. OF TV. CHANNEL.
4.5 MC
26.25 MC − 21.75 MC = 4.5 MC
FOR SOUND IF CHANNEL.
(INTER CARRIER SOUND SYSTEM)
21.75 MC (SOUND CARRIER IF AMP. FREQ.)
24.5 MC "BFO" GEN. FREQ.
26.25 MC (PICTURE CARRIER IF AMP. FREQ.)

CHASSIS-TOP VIEW

C34	1000	150	47B20A102N1	1468-001	1W5D1	MW.5-21	1FM-21	1st Video IF Decoup.-Cer.
C35	50	500	47B20500K5	1468-00005	5W5Q5	MO.5-45	1FM-45	IF Coupling-Cer.
C36	1000	150	47B20A102N1	1468-001	1W5D1	MW.5-21	1FM-21	AGC Filter-Cer.
C37	1000	150	47B20A102N1	1468-001	1W5D1	MW.5-21	1FM-21	2nd Video IF Decoup.-Cer.
C38	50	150	47B20500K5	1468-00005	5W5Q5	MO.5-45	1FM-45	IF Coupling-Cer.
C39	1000	150	47B20A102N1	1468-001	1W5D1	MW.5-21	1FM-21	3rd Video IF Decoup.-Cer.
C40	100	500	47B20101K5	1468-0001	5W5T1	MO.5-31	1FM-31	IF Coupling -Cer.
C41	10	500	47A160-11	1468-00001	5W5Q1			Fixed Trimmer
C42	1	500	47A160-2	1468-000001				Sound IF Coupling
C43	100	500	47B20101K5	1468-0001	5W5T1	MO.5-31	1FM-31	" " -Cer.
C44	330	500	47B0331K5					Diode Load. Cap.-Cer.
C45	1000	150	47B20A102N1	1468-001	1W5D1	MW.5-21	1FM-21	De-emphasis - "
C46	1000	150	47B20A102N1	1468-001	1W5D1	MW.5-21	1FM-21	Fil. Bypass - "
C47	1000	150	47B20A102N1	1468-001	1W5D1	MW.5-21	1FM-21	" " - "
C48	1000	150	47B20A102N1	1468-001	1W5D1	MW.5-21	1FM-21	" " - "
C49	1000	150	47B20A102N1	1468-001	1W5D1	MW.5-21	1FM-21	" " - "
C50	1000	150	47B20A102N1	1468-001	1W5D1	MW.5-21	1FM-21	" " - "
C51	1000	150	47B20A102N1	1468-001	1W5D1	MW.5-21	1FM-21	" " - "
C52	1000	150	47B20A102N1	1468-001	1W5D1	MW.5-21	1FM-21	" " - "
C53	1000	150	47B20A102N1	1468-001	1W5D1	MW.5-21	1FM-21	" " - "
C54	1000	150	47B20A102N1	1468-001	1W5D1	MW.5-21	1FM-21	" " - "
C55	4.7	500	47A160-6					H.V. Osc. Feedback
C56	1000	150	47B20A102N1	1468-001	1W5D1	MW.5-21	1FM-21	H.V. Osc. Grid- -Cer.
C57	100	500	47B20101K5	1468-0001	5W5T1	MO.5-31	1FM-31	Hor. Osc. Feedback- "
C58	100	500	47B20101K5	1468-0001	5W5T1	MO.5-31	1FM-31	Hor. Discharge - "
C59	680	500	CM20A681M		1W5T7			Hor. Coupling
C60	6	500	CM20A060M					" " - See Note 5.
C61	100	500	47B20101K5	1468-0001	5W5T1	MO.5-31	1FM-31	RF Bypass -Cer.
C62	.05	200	46AU503J	484-05	DT2S5	ST-4-05	TM-15	AGC Filter
C63	.1	200	46AU104J	484-.1	DT2P1	ST-2-1	TM-1	Fil. Bypass
C64	.1	200	46AU104J	484-.1	DT2P1	ST-2-1	TM-1	Video Coupling
C65	.25	200	46AT254J	484-25	DT2P25	ST-2-25	TC-2	" "
C66	.25	200	46AT254J	484-25	DT2P25	ST-2-25	TC-2	" "
C67	.25	200	46AT254J	484-25	DT2P25	ST-2-25	TC-2	" "
C68	.02	400	46AU203J	484-02	DT4S2	ST-4-02	TM-12	Sound IF Screen Byp.
C69	.02	400	46AU203J	484-02	DT4S2	ST-4-02	TM-12	Audio Coupling
C70	.05	200	46AU503J	484-05	DT2S5	ST-4-05	TM-15	Vol. Cont. Isolation
C71	.05	200	46AU503J	484-05	DT2S5	ST-4-05	TC-15	AF Screen Bypass
C72	.01	200	46AU103J	484-01	DT2S1	ST-4-01	TM-11	Audio Coupling
C73	.02	200	46AU203J	484-02	DT2S2	ST-4-02	TM-12	Output Plate Bypass
C74	.25	600	46AX254J	684-25	DT6P25	ST-6-25	TC-2	Hor. Osc. Plate Decoup.
C75	.0005	6000	46A145					Hor. Coupling
C76	.0005	6000	46A145					" "
C77	.005	600	46AU502J	684-005	DT6D5	ST-6-005	TM-25	Integrator Network
C78	.005	600	46AU502J	684-005	DT6D5	ST-6-005	TM-25	" "
C79	.05	200	46AU503J	484-05	DT2S5	ST-4-05	TM-15	Vert. Sync. Coupling
C80	.25	600	46AX254J	684-25	DT6P25	ST-6-25	TC-2	Vert. Osc. Decoup.
C81	.01	600	46AZ103J	684-01	DT6S1	ST-6-01	TM-12	Vert. Osc. Feedback
C82	.1	600	46AY104J	684-.1	DT6P1	ST-6-1	TM-1	Vertical Discharge
C83	.25	600	46AX254J	684-25	DT6P25	ST-6-25	TC-2	Vertical Coupling
C84	.1	600	46AY104J	684-.1	DT6P1	ST-6-1	TM-1	" "
C85	.05	6000	46B144					" "
C86	.05	6000	46B144					" "
C87	.1	200	46AU104J	484-.1	DT2P1	ST-2-1	TM-1	Fil. Bypass
C88	.001	6000	46A146				TM-21	H.V. Filter
C89	.1	600	46AY104J	684-.1	DT6P1	ST-6-1	TM-1	Hor. Cent. Filter
C90	.25	600	46AX254J	684-25	DT6P25	ST-6-25	TC-2	H.V. Osc. Cath. Byp.
C91	.25	600	46AX254J	684-25	DT6P25	ST-6-25	TC-2	H.V. Osc. Decoupling
C92	.001	6000	46A146					H.V. Filter
C93	.25	200	46AT254J	484-25	DT2P25	ST-2-25	TC-2	AGC Filter

Note 1-Some models use a 60-30 MFD. 450-300V. capacitor (Hallicrafter Part #45B126) which replaces Item C2 & C3.
Note 2-Not used in models employing Item C10.
Note 3-Not used in models employing Items C8 & C9.
Note 4-Some models use a 2.2 MMFD bakelite capacitor in this application (Hallicrafters #47A160-4).
Note 5-Some models use two 3.3 MMFD cap. (Part #47A160-11) in parallel in this application. It is suggested that the single 6 MMFD cap. be used as a service replacement which replaces both 3.3 MMFD capacitors.

R68	680KΩ	½	RC20AE684M	BTS-680K	Blue-Gray-Yl. Vert. Osc. Grid	± 10%
R69	47KΩ	1	RC30AE473M	BTA-47K	Yl.-Vi.-Or. Vert. Osc. Plate	± 10%
R70	100KΩ	1	RC30AE104M	BTA-100K	Br.-Blk.-Yl. Decoupling	± 10%
R71	1.5 Meg.	½	RC20AE155M	BTS-1.5 Meg.	Br.-Grn.-Grn. Vert. Osc. Plate Load	± 10%
R72	2700Ω	1	RC30AE272M	BTA-2700	Red-Vi.-Red Vert. Amp. Cathode	± 10%
R73	150KΩ	½	RC20AE154M	BTS-150K	Br.-Grn.-Yl. Vert. Amp. Grid	± 10%
R74	2.2 Meg.	½	RC20AE225M	BTS-2.2 Meg.	Red-Red-Grn. Voltage Divider	± 10%
R75	100KΩ	1	RC30AE104M	BTA-100K	Br.-Blk.-Yl. Vert. Amp. Plate	± 10%
R76	100KΩ	1	RC30AE104M	BTA-100K	Br.-Blk.-Yl. " " "	± 10%
R77	5.6 Meg.	1	RC30AE565M	BTA-5.6 Meg.	Grn.-Blue-Grn. Vert. Deflection Load	± 10%
R78	5.6 Meg.	1	RC30AE565M	BTA-5.6 Meg.	Grn.-Blue-Grn. " " "	± 10%
R79	4.7 Meg.	1	RC30AE475M	BTA-4.7 Meg.	Yl.-Vi.-Grn. Hor. Deflection Load	± 10%
R80	4.7 Meg.	1	RC30AE475M	BTA-4.7 Meg.	Yl.-Vi.-Grn. " " "	± 10%
R81	3.3 Meg.	1	RC30AE335M	BTA-3.3 Meg.	Or.-Or.-Grn. Bleeder Network	± 10%
R82	3.3 Meg.	1	RC30AE335M	BTA-3.3 Meg.	Or.-Or.-Grn. " "	± 10%
R83	3.3 Meg.	1	RC30AE335M	BTA-3.3 Meg.	Or.-Or.-Grn. " "	± 10%
R84	3.3 Meg.	1	RC30AE335M	BTA-3.3 Meg.	Or.-Or.-Grn. " "	± 10%
R85	4.7 Meg.	1	RC30AE475M	BTA-4.7 Meg.	Yl.-Vi.-Grn. " "	± 10%
R86	4.7 Meg.	1	RC30AE475M	BTA-4.7 Meg.	Yl.-Vi.-Grn. " "	± 10%
R87	3.9 Meg.	1	RC30AE395M	BTA-3.9 Meg.	Or.-Wh.-Grn. " "	± 10%
R88	3.9 Meg.	1	RC30AE395M	BTA-3.9 Meg.	Or.-Wh.-Grn. " "	± 10%
R89	39Ω	1	RC30AE390K		Or.-Wh.-Blk. HV Osc. Fil. Shunt	± 10%
R90	5600Ω	½	RC20AE562K	BTS-5600	Grn.-Blue-Red HV Osc. Grid	± 10%
R91	120KΩ	1	RC30AE124K	BTA-120K	Br.-Red-Yl. H.V. Filter	± 10%
R92	68Ω	2	RC40AE680M		Blue-Gray-Blk. Sound Det. Fil. Shunt	± 10%
R93	47Ω	1	RC30AE470K		Yl.-Vi.-Blk. Osc. Fil. Shunt-See Note 1	± 10%
R94	6800Ω	2	RC40AE682M	BT-2-6800	Blue-Gray-Red Osc. Decoupling-See Note 2	± 10%
R95	6800Ω	2	RC40AE682M	BT-2-6800	Blue-Gray-Red " " " " "	± 10%
R96	18Ω	2	RC40AE180M	BW-2-18	Br.-Gray-Blk. Rectifier Ballast-See Note 3	± 10%
R97	18Ω	10	24BG180E	ABA-20*	W.W. Filament Dropping	
R98	1200Ω	1	RC30AE122M	BTA-1200	Br.-Red-Red Filter	± 10%
R99	680Ω	2	RC40AE681M	BT-2-680	Blue-Gray-Br. "	± 10%

*Set slider at 18Ω.
Note 1-Some models use a 39Ω-1 watt resistor in this application.
Note 2-Some models use a 3300Ω-2 watt resistor in this application. For replacement use 2-680Ω 2 watt resistors in parallel.
Note 3-Some models use 2-39Ω 1 watt resistors in parallel in this application.

TRANSFORMER (H.V. OSC.)

ITEM No.	DC RES. PRI.	DC RES. SEC. 1	DC RES. SEC. 2	DC RES. SEC. 3	REPLACEMENT DATA HALLICRAFTERS PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
T1	21Ω	6.5Ω	310Ω	.1Ω	51B1038			

TRANSFORMER (SOUND OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA HALLICRAFTER PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	INSTALLATION NOTES
T2	1800Ω	3.5Ω	180Ω	.7Ω	55B060-3	A-3876	T22S45*	A-2928	*Drill one new mtg. hole,

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D.C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA HALLICRAFTERS PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.	INSTALLATION NOTES
L1	120 MA.	58Ω	3.7 Henries	56C093				

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA HALLICRAFTERS PART No.	MEISSNER PART No.	NOTES
L2	Ant. Coil	0Ω		51A1039		
L3	RF Coil	0Ω		51A1049		Wound on 1 Meg. 1 Watt Carbon Resistor
L4	RF Load Coil	0Ω		51A1050		Wound on 3300Ω 1 Watt Carbon Resistor
L5	" " "	0Ω		51A1051		" " 2200Ω 1 " " "
L6	" " "	0Ω		51A1052		" " 1000Ω 1 " " "
L7	Mixer Coil	0Ω		51A1045		" " 1 Meg.1 " " "
L8	Mixer Load Coil	0Ω		51A1046		" " 3300Ω 1 " " "
L9	"	0Ω		51A1047		" " 2200Ω 1 " " "
L10	"	0Ω		51A1048		" " 3300Ω 1 " " "
L11	Osc. Coil	0Ω		51A1041		" " 1 Meg.1 " " "
L12	Osc. Load Coil	0Ω		51A1042		" " 1 Meg.1 " " "
L13	"	0Ω		51A1043		" " 1 Meg.1 " " "
L14	"	0Ω		51A1044		" " 1 Meg.1 " " "
L15	1st IF Coil	.1Ω		50A372		
L16	2nd IF Coil	.1Ω		50A372		
L17	3rd IF Coil	.1Ω		50A372		

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA HALLICRAFTERS PART No.	CLAROSTAT PART No.	IRC PART No.		NOTES
R1A	1000Ω		25B739	43-1000			Contrast Control-Wire Wound
B	Switch			SPST Sw.			On Off Switch
R2A	25KΩ	½	25B722	AM-40-S	D11-120		Brightness Control
B	Shaft			KSS-3	E		
R3A	1 Meg.	½	25B721	AM-63-Z	D13-137		Volume Control
B	Shaft			KSS-3	E		
R4A	500KΩ	½	25B720	AM-58-S	D11-133		Horizontal Hold Control
B	Shaft			KSS-3	E		
R5A	500KΩ	½	25B720	AM-58-S	D11-133		Vertical Hold Control
B	Shaft			KSS-3	E		

HIGH VOLTAGE OSC. ADJUSTMENT

A potential of approximately 5000 volts exists in this circuit. Exercise extreme care while making this adjustment. Do not use hand held leads. Spot solder the resistor string in place as outlined below.

1. Solder five 10 Megohm resistors in series. Connect this 50 Megohm string in series with a 0-150 microampere meter across the high voltage capacitor C88 with the meter on the ground side.
2. A reading of 95 microamperes indicates a potential of 4700 volts which is normal. If the voltage is not correct, set the Brightness control to full counter-clockwise and adjust the H. V. Oscillator trimmer, B1, for the correct voltage. The trimmer should be set on the maximum capacity side of resonance. At the correct setting turning B1 clockwise will decrease the voltage.

SERVICE HINTS

HUM TROUBLE: On models employing a type 6SH7 as an audio amplifier, it has been found that excessive heater to cathode leakage may develop after some usage. Replace the 6SH7 with a type 6SJ7 which has a lower leakage. No circuit changes are required.

BURNOUT OF OSCILLATOR DECOUPLING RESISTOR: If all channel selector buttons are disengaged for a considerable length of time, the oscillator decoupling resistor may burn out due to the excessive drain of the oscillator. In those models having a single 3300Ω resistor it is suggested in case of burnout that two 6800Ω 2 Watt (Items R55 and R95) in parallel be used for replacement.

BURNOUT OF HORIZONTAL AMPLIFIER PLATE RESISTORS: Some models incorporated 1 Watt resistors in this application (R62 and R63). In the event of burnout of these parts they should be replaced with 47KΩ 2 Watt resistors.

CHANGE OF POSITION OF 7JP4 IN HEATER STRING: The 7JP4 tube was wired in the filament string directly below R97 in some models. For additional protection for this tube it should be wired in just above the 6X5GT as shown on the schematic.

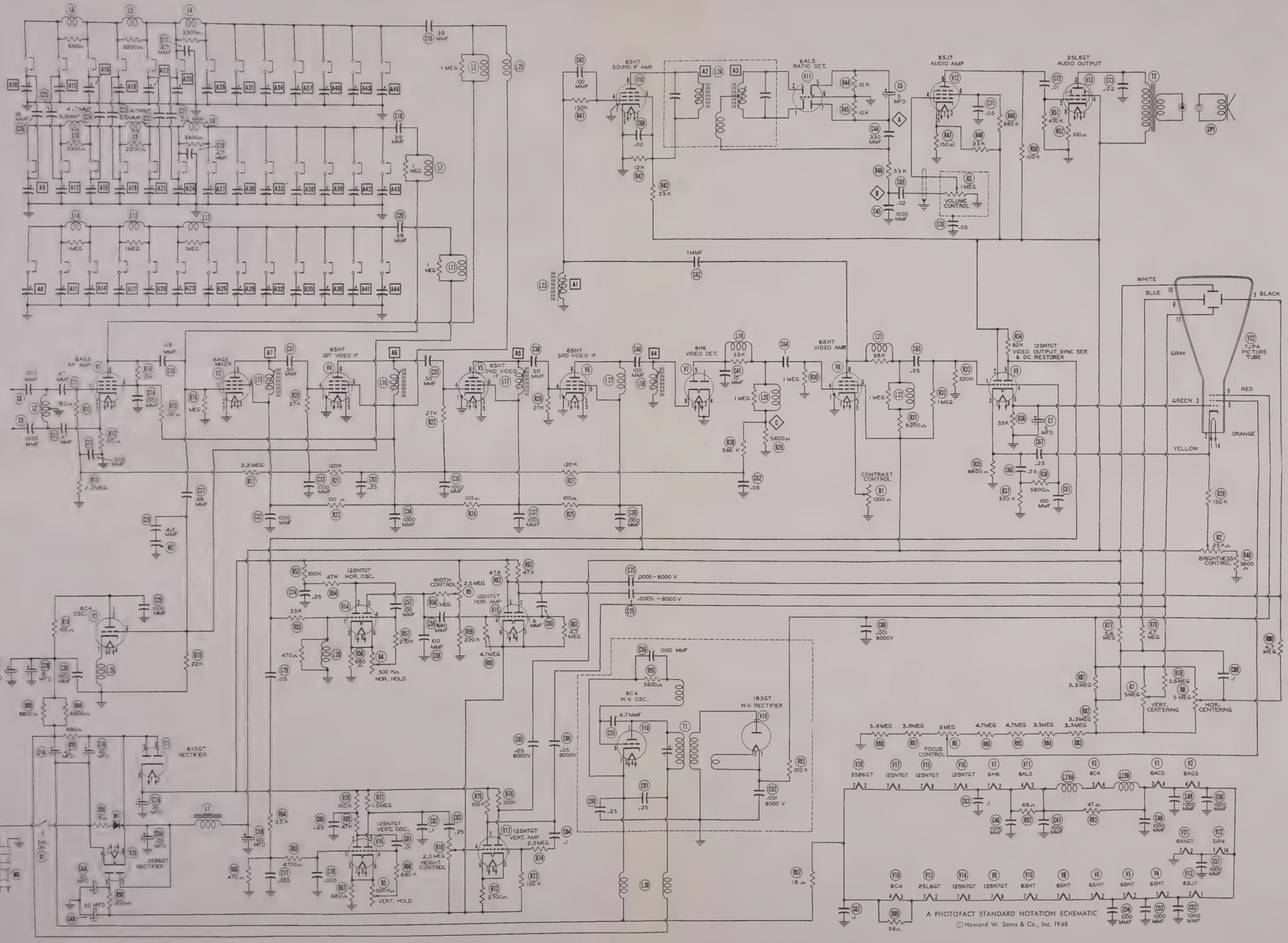
FAILURE OF C60: Some models incorporate two 3 MMFD. capacitors in parallel in this application. In the event of failure replacement should be made with a 6 MMFD capacitor as listed in the parts list.

FAILURE TO SYNC. PROPERLY: In some installations where a great amount of hum and low frequency noise is present intermodulation in the rf stage may take place. This is usually the case when the receiver fails to synchronize properly. This may be corrected in some cases by grounding one side of the antenna lead-in.

Models lower than serial number 61436 did not use Items C8 & C9. Instead the antenna was connected directly to the antenna coil and the center tap was bypassed to chassis by a 47 MMFD capacitor (C10). If the above difficulty is experienced the circuit may be easily changed to conform with the schematic to minimize the effects of hum and low frequency noise.

RESIDUAL HUM: If residual hum is experienced, especially on the higher frequency channels, check the oscillator plate bypass capacitor (C30) and the 6X5 filament bypass (C51). On those models where these parts are not employed, they may be added.

ARCING BETWEEN PICTURE TUBE SOCKET AND BRACKET: Some arcing was experienced on the early models. As a result the bracket was redesigned with a cutout near the high voltage leads. On those receivers not having this cutout, a satisfactory repair may be made by filling the tube socket recesses with Dow-Corning Compound No. 4 Ignition Seal.


6SH7 SOUND IF AMP
6AL5 RATIO DET.
6SJ7 AUDIO AMP
25L6GT AUDIO OUTPUT
VOLUME CONTROL
6AG5 RF AMP
6AG5 MIXER
6SH7 1ST VIDEO IF
6SH7 2ND VIDEO IF
6SH7 3RD VIDEO IF
6H6 VIDEO DET.
6SH7 VIDEO AMP
12SN7GT VIDEO OUTPUT, SYNC SEP. & DC RESTORER
CONTRAST CONTROL
WHITE
BLUE
BLACK
GRAY
RED
GREEN
ORANGE
YELLOW
7JP4 PICTURE TUBE
BRIGHTNESS CONTROL
12SN7GT HOR. OSC.
WIDTH CONTROL
12SN7GT HOR. AMP
6C4 OSC.
HOR. HOLD
6C4 H.V. OSC.
1B3GT H.V. RECTIFIER
.005 - 6000 V
.0005 - 6000 V
VERT. CENTERING
HOR. CENTERING
FOCUS CONTROL
6X5GT RECTIFIER
2526GT RECTIFIER
12SN7GT VERT. OSC.
12SN7GT VERT. AMP
2.5 MEG HEIGHT CONTROL
VERT. HOLD
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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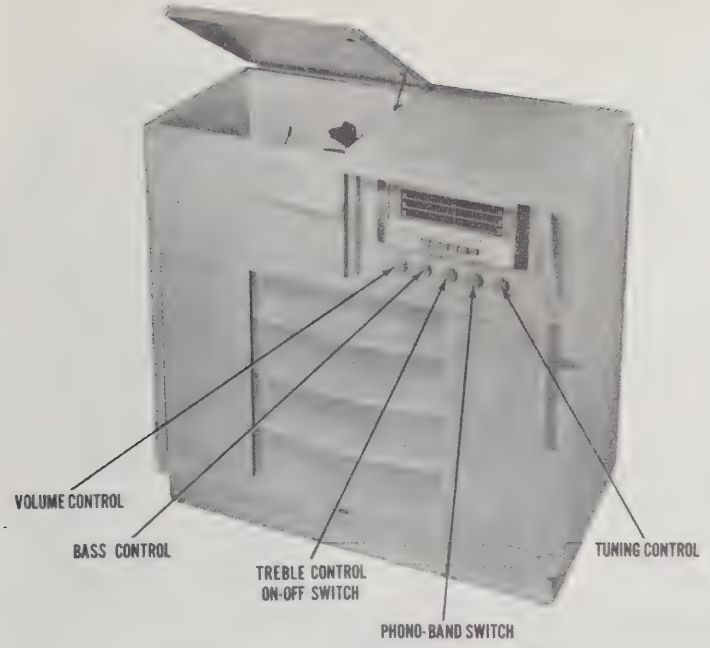

HOFFMAN MODEL C501

TRADE NAME	Hoffman, Models C501, C511
MANUFACTURER	Hoffman Radio Corp., 3761 S. Hill St., Los Angeles, Calif.
TYPE SET	AC Operated Combination Phono-Radio, Multi-Band Superheterodyne Rec. with Loop Ant.
TUBES (ELEVEN)	Types, 6SK7 RF Amp., 6SA7 Converter, 6SK7 IF Amp., 6SQ7 Det.-AVC-AF, 6J5 Tone Control, 6J5 Phase Inv., (4) 6K6GT Power Output, 5U4G Rectifier.
POWER SUPPLY	110-120 Volts AC — RATING .94 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540-1600KC — **SHORT WAVE** 5.6-10.4MC, 9.4-19.4MC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set dial pointer turn tuning cap. fully closed and set pointer 1-13/16" from left edge of dial backplate. This is the calibration mark referred to in steps below.

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to rear stator of tuning cap. Low side to chassis.	455KC	Band"A" (1 position clockwise)	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4	Adjust for maximum output.
2	400Ω carbon res.	High side to ant. terminal. Low side to chassis.	18MC	Band"C" (3 positions clockwise)	5-13/16" from calibration mark.	"	A5	" " " "
3	"	"	"	"	Tune for maximum output.	"	A6,A7	Rock tuning cap. and adjust for maximum output.
4	"	"	10MC	Band"B" (2 positions clockwise)	6-1/16" from calibration mark.	"	A8	Adjust for maximum output. Tune sig. gen. to 10.91 MC. If signal is not heard retune sig. gen. to 10MC and open A8 to next peak. Adjust for maximum output and recheck for image.
5	"	"	"	"	Tune for maximum output.	"	A9,A10	Rock tuning cap. and adjust for maximum output.
6	200MMFD	"	1400KC	Band"A"	5-15/16" from calibration mark.	"	A11	Adjust for maximum output.
7	200MMFD	"	"	"	Tune for maximum output.	"	A12, A13	" " " "
8	200MMFD	"	600KC	"	1-1/8" from calibration mark.	"	A14	" " " "
9	200MMFD	"	"	"	Tune for maximum output.	"	A15	Adjust for maximum output. Repeat Steps 6, 7, 8 and 9 until no further improvement can be made.

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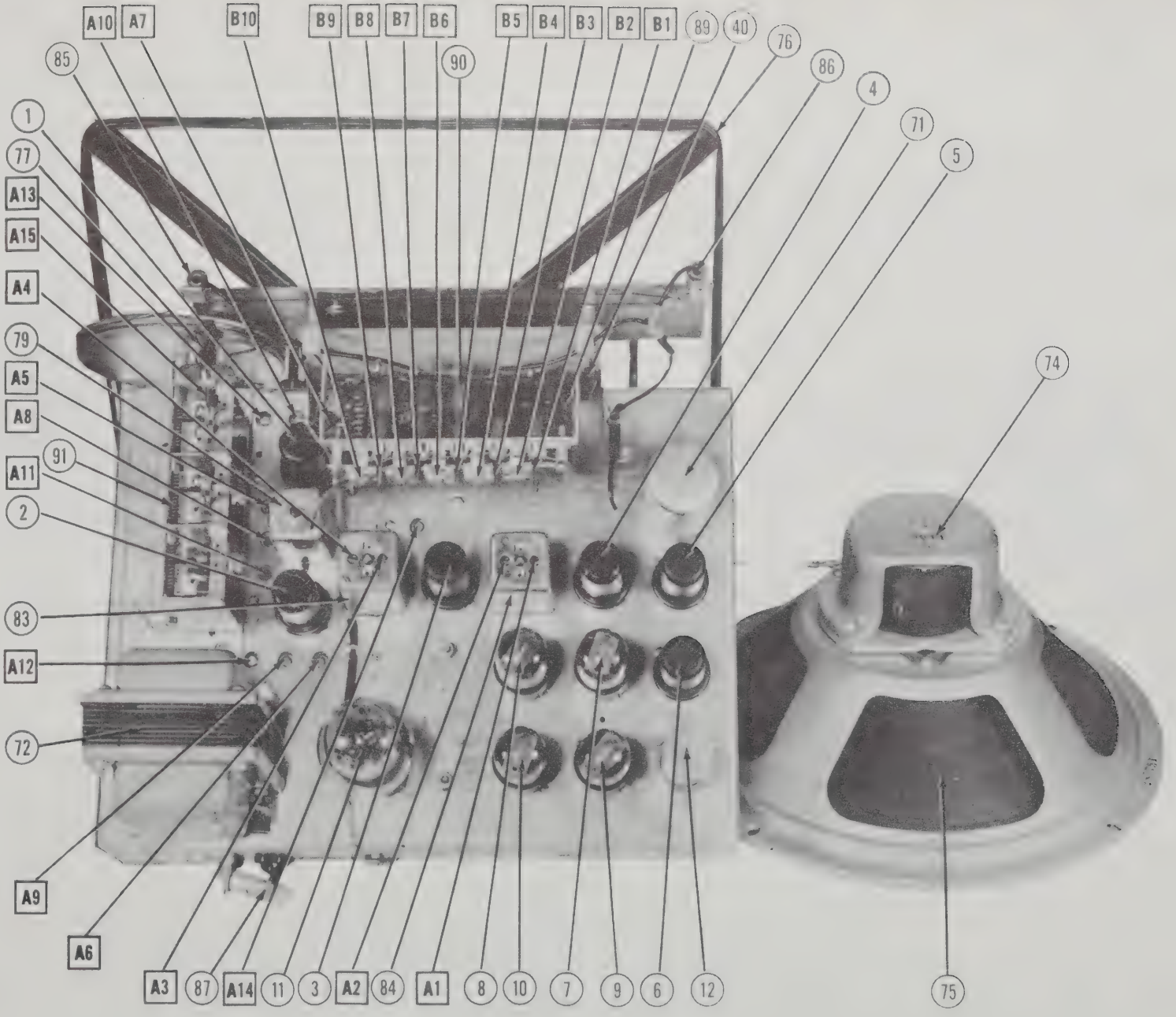
DATE 10/48-#4818-11 SET #48-FOLDER #11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B10
B9
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B4
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HOFFMAN
MODELS C-501, C-511 PAGE 3

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: HOFFMAN PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	6SK7	6SK7	8N	
2	Converter	6SA7	6SA7	8R	
3	IF Amp.	6SK7	6SK7	8N	
4	Det.-AVC-AF	6SQ7	6SQ7	8Q	
5	Tone Control	6J5	6J5	6Q	
6	Phase Inv.	6J5	6J5	6Q	
7	Power Output	6K6GT	6K6GT	7S	
8	" "	6K6GT	6K6GT	7S	
9	" "	6K6GT	6K6GT	7S	
10	" "	6K6GT	6K6GT	7S	
11	Rectifier	5U4G	5U4G	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: HOFFMAN PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
12A	20	450	4200	AF444J	UP2245C	DY-312	EL-350	▲ Filter
B	20	450						■ "
C	20	25						Cathode Bypass
13	10	475	4203	PRS450/10	BR1045	M-10-450	UT-12	Decoupling
14	20	450		PRS450/20	BR2045	M-20-450	UT-20	"
15	.01	600	4103	684-01	DT6S1	ST-6-01	TC-11	Line Filter
16	.001	600	4104	684-001	DT6D1	ST-6-001	TC-21	Output Plate Bypass
17	.001	600	4104	684-001	DT6D1	ST-6-001	TC-21	" " "
18	.02	400	4106	484-02	DT4S2	ST-4-02	TC-12	Audio Coupling
19	.01	600	4103	684-01	DT6S1	ST-6-01	TC-11	" "
20	.01	400	4112	484-01	DT4S1	ST-4-01	TC-11	" "
21	.01	600	4103	684-01	DT6S1	ST-6-01	TC-11	Tone Comp.
22	.005	600	4102	684-005	DT6D5	ST-6-005	TC-25	" "
23	.5	200	4110	484-.5	DT2P5	ST-2-5	TC-5	" "
24	.01	600	4103	684-01	DT6S1	ST-6-01	TC-11	Audio Coupling
25	.01	600	4103	684-01	DT6S1	ST-6-01	TC-11	" "
26	.05	400	4101	484-05	DT4S5	ST-4-05	TC-15	Decoupling
27	.05	400	4101	484-05	DT4S5	ST-4-05	TC-15	RF Byp. Pwr. Supply
28	.05	200	4100	484-05	DT2S5	ST-4-05	TC-15	AVC Filter
29	.05	200	4100	484-05	DT2S5	ST-4-05	TC-15	" "
30	100	500	4000	1468-0001	5W5T1	MO.5-31	1FM-31	AF Plate Bypass
31	100	500	4000	1468-0001	5W5T1	MO.5-31	1FM-31	Diode RF Filter
32	100	500	4000	1468-0001	5W5T1	MO.5-31	1FM-31	" " "
33	100	500	4000	1468-0001	5W5T1	MO.5-31	1FM-31	Tone Comp.-See Note
34	330	300	4010	1468-0003	5W5T3	MO.5-33	1FM-33	" " " " -Cer.
35	330	300	4010	1468-0003	5W5T3	MO.5-33	1FM-33	" " "
36	650	300	4011	1468-0006	1W5T6	MO.5-36	1FM-36	" " "
37	2300	300	4006					Fixed Padder
38	1050	300	4005					" "
39	47	500	4007	1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap.
40	500	500	4004	1469-0005	5R5T5	MOS.5-35	MS-35	Fixed Trimmer

Note-Not used in all models.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: HOFFMAN PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
41A	500KΩ	½	4804	D13-133	M-60-Z	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 41A per instructions
42A	50KΩ	½	4806	D11-123		Bass Control
B	Shaft		Not Req.	A		Attach to 42A per instructions
43A	250KΩ	½	4805	D13-130	M-64-Z	Treble Control
B	Shaft		Not Req.	A	Not Req.	Attach to 43A per instructions
C	Switch		" "	41	SW-A	" " " " "

PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	REPLACEMENT DATA: HOFFMAN PART No.	REPLACEMENT DATA: MEISSNER PART No.
76	Loop Ant.	.2Ω	.2Ω	55210	
77	Loop Load Coil A		3.5Ω	5220	
78A	Ant. Coil B	.2Ω	.1Ω	5217	
B	" " C	.1Ω	0Ω	5217	
79	RF Coil A	1Ω	3.5Ω	5216	
80A	" " B	.8Ω	.2Ω	5219	
B	" " C	.4Ω	0Ω	5219	
81	Osc. " A		4.5Ω	5215	14-1060
82A	" " B		.2Ω	5218	
B	" " C		0Ω	5218	
83	Input IF	13Ω	12Ω	5213	16-6658
84	Output IF	13.5Ω	13Ω	5214	16-6660

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: HOFFMAN PART No.	REPLACEMENT DATA:	INSTALLATION NOTES
85-87	Bayonet	6-8	0.25	Blue			Type 44

MISCELLANEOUS

ITEM No.	PART NAME	HOFFMAN PART No.	NOTES
88	Switch	6005	Band
89	"	6004	Pushbutton
90	PB Coil Assby.	55200	
91A	3 Gang Var. Cap.	4403	BC (12-277MMF) each section
B	" " " "		SW (11-172MMF) " "
A5	Trimmer Strip	4300	Band "C" Osc. Adj.
A8			" "B" " "
A11			" "A" " "
A6	" "	4300	" "C" RF "
A9			" "B" " "
A12			" "A" " "
A7	" "	4300	" "C" Ant. "
A10			" "B" " "
A13			" "A" " "
A14	Padder	4301	" "A" Osc. "

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	HOFFMAN PART No.	IRC PART No.	
44	100KΩ	½	4511	BTS-100K	Br.-Blk.-Yl. AVC Network
45	22KΩ	½	4501	BTS-22K	Red-Red-Or. Oscillator Grid
46	2.2 Meg.	½	4502	BTS-2.2 Meg.	Red-Red-Grn. AVC Network
47	10KΩ	2	4503	BT-2-10K	Br.-Blk.-Or. Screen Dropping
48	47KΩ	½	4504	BTS-47K	Yl.-Vi.-Or. Diode RF Filter
49	10 Meg.	½	4505	BTS-10 Meg.	Br.-Blk.-Blue AF Grid
50	220KΩ	½	4500	BTS-220K	Red-Red-Yl. AF Plate Load
51	1 Meg.	½	4513	BTS-1 Meg.	Br.-Blk.-Grn. Tone Amp. Grid
52	2200Ω	½	4512	BTS-2200	Red-Red-Red Tone Amp. Cathode
53	22KΩ	½	4501	BTS-22K	Red-Red-Or. Tone Amp. Cathode
54	47KΩ	½	4504	BTS-47K	Yl.-Vi.-Or. Tone Amp. Plate Load
55	1 Meg.	½	4513	BTS-1 Meg.	Br.-Blk.-Grn. Phase Inverter Grid
56	2200Ω	½	4512	BTS-2200	Red-Red-Red Phase Inverter Cathode
57	47KΩ	½	4504	BTS-47K	Yl.-Vi.-Or. Phase Inverter Cathode
58	47KΩ	½	4504	BTS-47K	Yl.-Vi.-Or. Phase Inverter Plate Load
59	470KΩ	½	4506	BTS-470K	Yl.-Vi.-Yl. Output Grid
60	470KΩ	½	4506	BTS-470K	Yl.-Vi.-Yl. " "
61	220Ω	3		ABA-250	Red-Red-Br. Output Cathode - See Note 1
62	1500Ω	6.5	4701	AB-1500	Filter -See Note 2
63	47KΩ	½	4504	BTS-47K	Yl.-Vi.-Or. Phono Tone Compensation
64	47KΩ	½	4504	BTS-47K	Yl.-Vi.-Or. " " "
65	22KΩ	½	4501	BTS-22K	Red-Red-Or. " " "
66	2.2 Meg.	½	4502	BTS-2.2 Meg.	Red-Red-Grn. " " " -See Note 2
67	10KΩ	½		BTS-10K	Br.-Blk.-Or. Tone Amp. Plate Load - " " "
68	220KΩ	½	4500	BTS-220K	Red-Red-Yl. Tone Compensation - " " "
69	4700Ω	½	4543	BTS-4700	Yl.-Vi.-Red Decoupling
70	470KΩ	½	4506	BTS-470K	Yl.-Vi.-Yl. Phono Shunt-See Note 2

Note 1 - Some models use 500Ω in this application. On IRC replacement set slider at 220Ω from one end.
Note 2 - Not used on all models.

FILTER CHOKE

ITEM NO.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ℧)	HOFFMAN PART NO.	STANCOR PART NO.	THORDARSON PART NO.	MERIT PART No.	
71		12Ω	3.7 Henries	5103				

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	HOFFMAN PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
72	117V AC @ .94A	600V CT .135A DC	5.0V AC @ 3.0A	6.0V AC @ 3.7A	5001	P-6313‡	T22R32	P-3155

‡Mount vertically with universal mounting bracket.

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		HOFFMAN PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
73	7000Ω CT	2.7Ω	530Ω CT	.4Ω	5108	A-3870	T22S58	A-2904‡	‡Drill one new mounting hole.

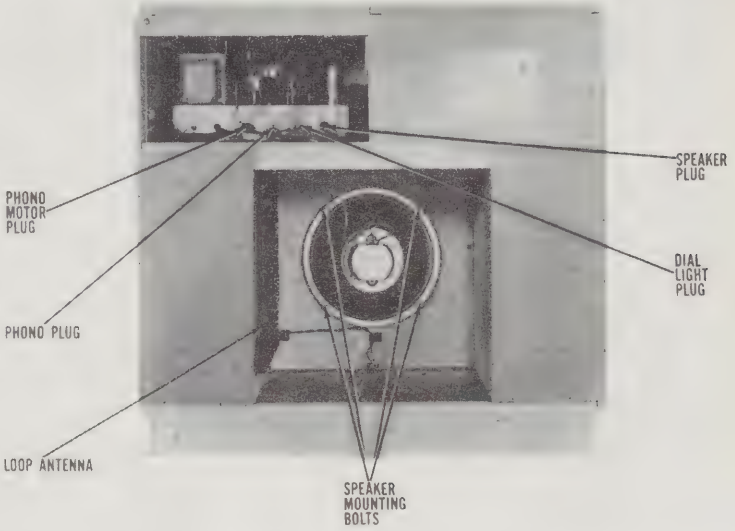
SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			HOFFMAN PART No.	JENSEN PART No.	QUAM PART No.	
74	FIELD RES. 490Ω	VC IMP. 2.7Ω	9044		12E60*	*Replace output transformer to match 6-8Ω voice coil
75	CONE DIA. 11-3/8"	VC DIA. 1-1/4"				

PUSHBUTTON ADJUSTMENTS

The frequency ranges for the pushbuttons in order from left to right are:
550-800KC, 550-800KC, 720-1200KC, 720-1200KC and 900-1500KC.

1. Turn receiver on and allow to warm up for at least fifteen minutes.
2. Make up a list of stations desired to be set up, making sure that each station falls within frequency range of its button.
3. Depress "manual" button and manually tune in station desired to be set up.
4. Depress 1st button and adjust B1 until station selected is at maximum volume.
5. Adjust B2 for maximum volume.
6. Check accuracy of setting by alternately switching from manual button to button being adjusted and readjusting B1 & B2 for maximum volume.
7. To set up the remaining buttons follow the procedure outlined above, adjusting B3,B5,B7 & B9 to tune in stations and B4,B6,B8 and B10 for maximum volume.
8. If the same station can be obtained with two settings of any oscillator slug use the one obtained with slug furthest out of coil.



DISASSEMBLY INSTRUCTIONS

1. Remove five push-on type control knobs.
2. Remove speaker and pilot light plugs from chassis.
3. Remove phono-pickup and phono-motor plugs from chassis.
4. Remove short wave antenna plug from chassis.
5. Remove loop leads from terminal strip on loop antenna.
6. Remove four bolts holding chassis in cabinet. Remove chassis from cabinet.
7. Remove two wood screws holding loop antenna in cabinet. Remove loop from cabinet.
8. Remove four bolts holding speaker in cabinet. Remove speaker from cabinet.

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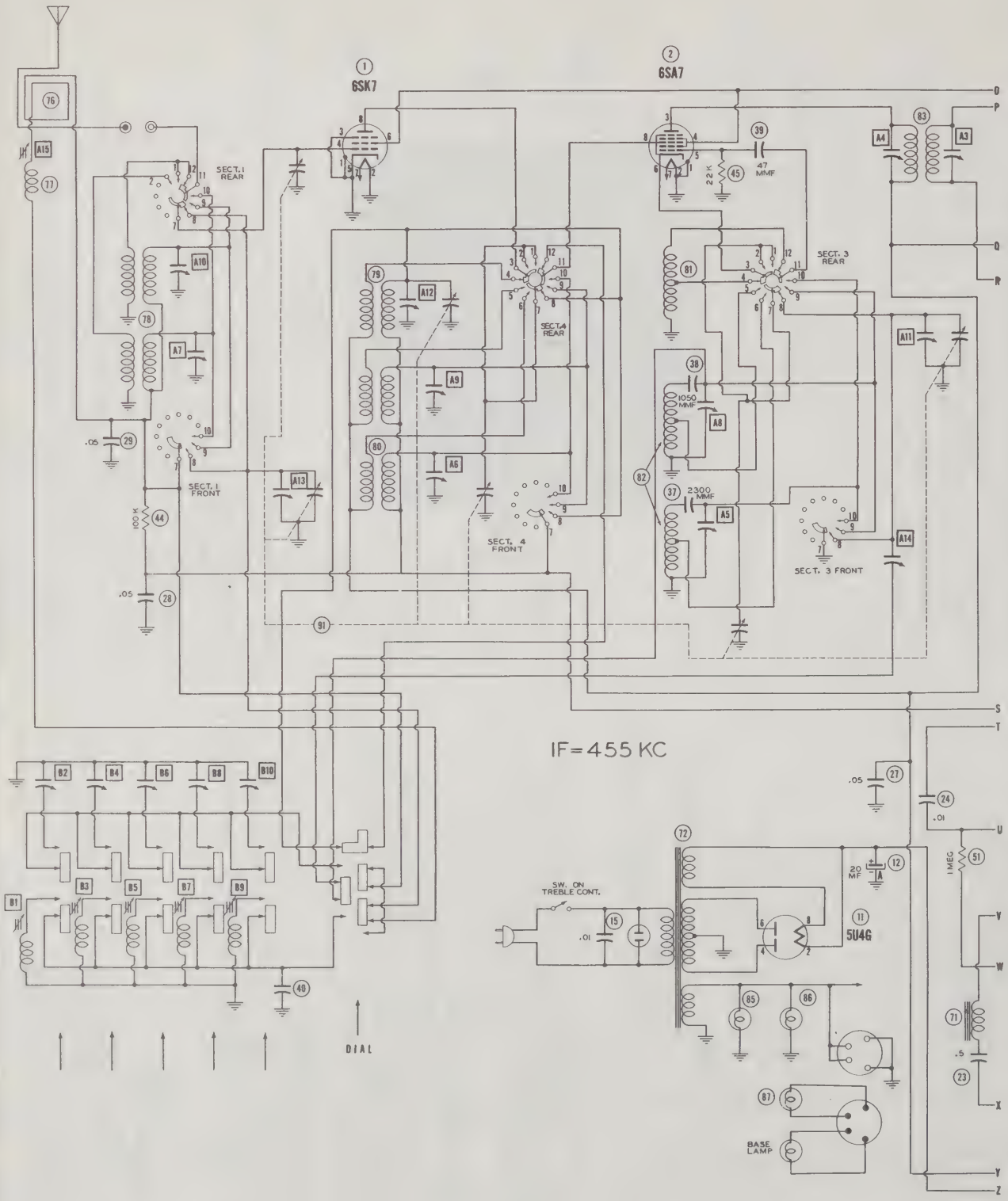

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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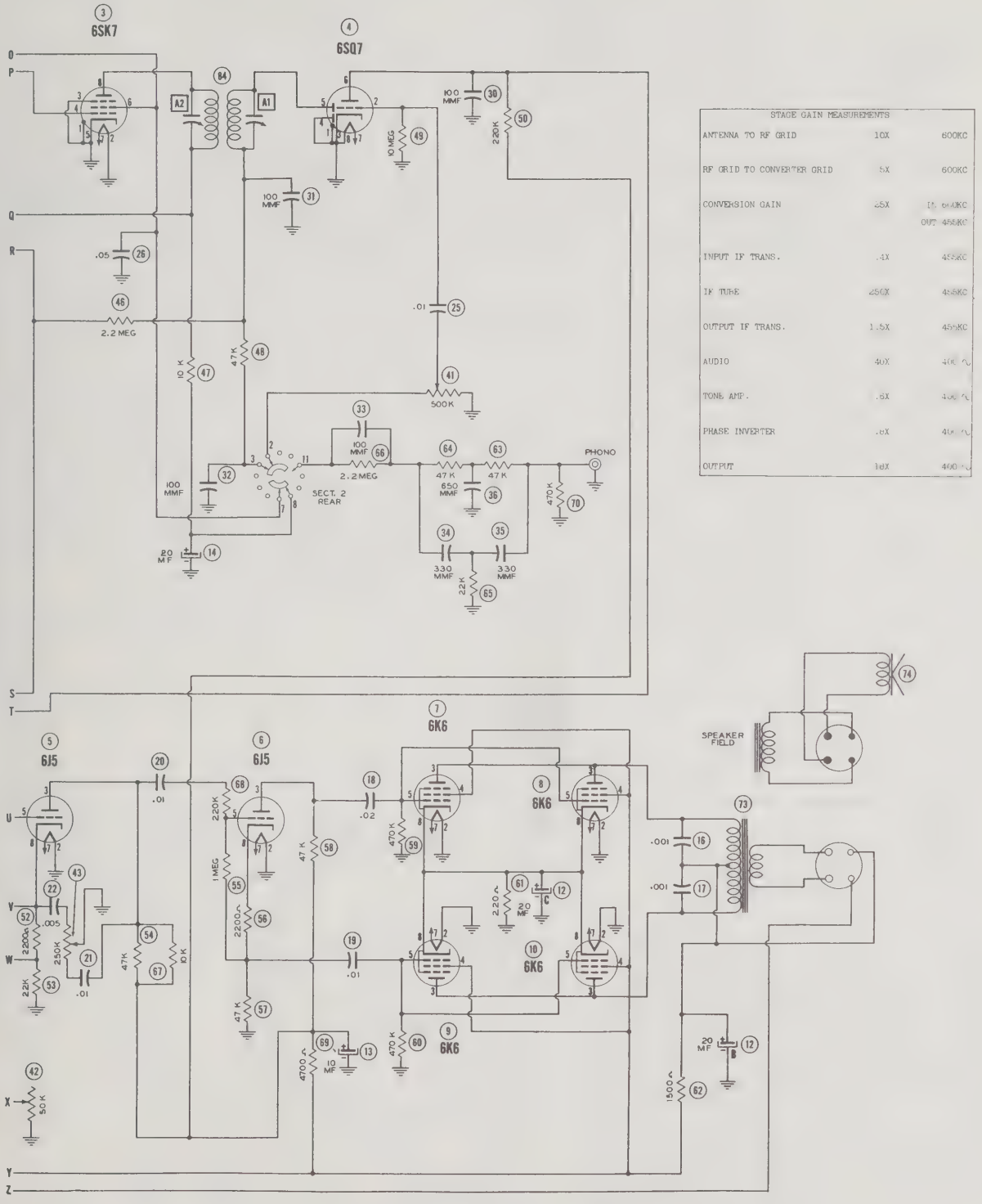

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

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VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6SK7	0V.	0V.	0V.	-.4VDC	0V.	90VDC	6VAC	240VDC
2	6SA7	0V.	0V.	240VDC	90VDC	-15VDC§	0V.	6VAC	-.4VDC
3	6SK7	0V.	0V.	0V.	-.4VDC	0V.	90VDC	6VAC	240VDC
4	6SQ7	0V.	-.4VDC	0V.	0V.	-.4VDC	100VDC	6VAC	0V.
5	6J5	0V.	0V.	200VDC	70VDC	9VDC	0V.	6VAC	60VDC
6	6J5	0V.	0V.	150VDC	55VDC	9VDC	25VDC	6VAC	70VDC
7	6K6GT	0V.	0V.	230VDC	240VDC	0V.	0V.	6VAC	20VDC
8	6K6GT	0V.	0V.	230VDC	240VDC	0V.	0V.	6VAC	20VDC
9	6K6GT	0V.	0V.	230VDC	240VDC	0V.	0V.	6VAC	20VDC
10	6K6GT	0V.	0V.	230VDC	240VDC	0V.	0V.	6VAC	20VDC
11	5U4G	0V.	310VDC	6VAC	300VAC	0V.	300VAC	90VDC	310VDC

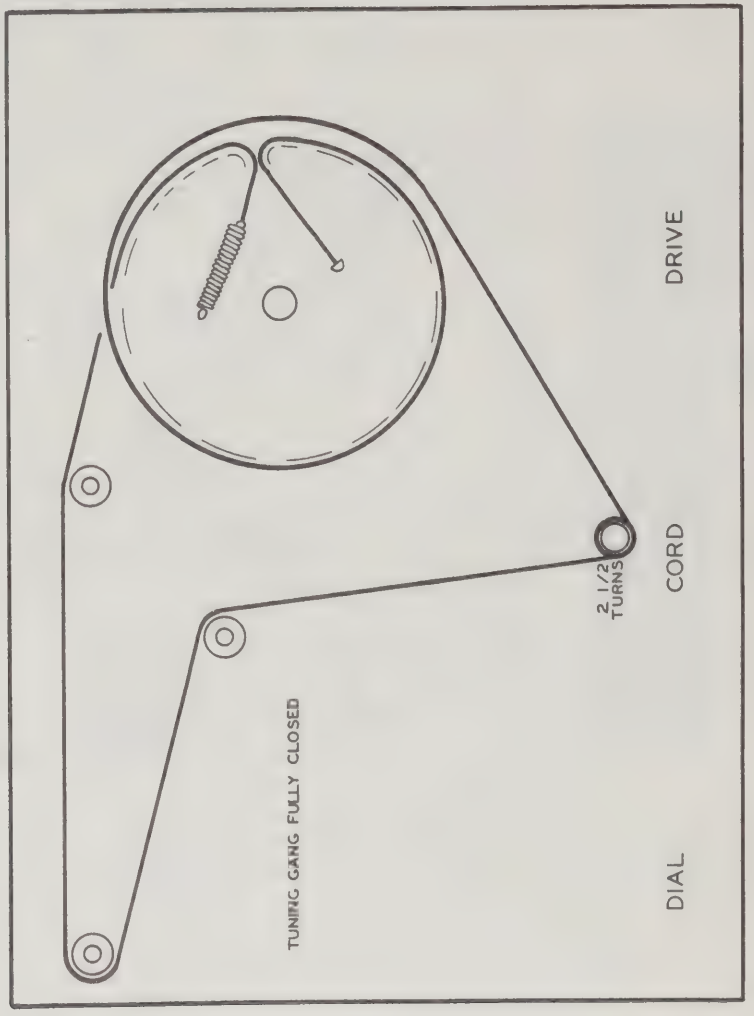
§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6SK7	0Ω	0Ω	0Ω	2.8 Meg.	0Ω	90KΩ	.1Ω	80KΩ
2	6SA7	0Ω	0Ω	80KΩ	90KΩ	22KΩ	.6Ω	.1Ω	2.8 Meg.
3	6SK7	0Ω	0Ω	0Ω	2.8 Meg.	0Ω	90KΩ	.1Ω	80KΩ
4	6SQ7	0Ω	10 Meg.	0Ω	0Ω	550KΩ	300KΩ	.1Ω	0Ω
5	6J5	0Ω	0Ω	90KΩ	22KΩ	1 Meg.	250KΩ	.1Ω	24KΩ
6	6J5	0Ω	0Ω	130KΩ	47KΩ	1 Meg.	1.3 Meg.	.1Ω	50KΩ
7	6K6GT	0Ω	0Ω	80KΩ	80KΩ	470KΩ	INF.	.1Ω	220Ω
8	6K6GT	0Ω	0Ω	80KΩ	80KΩ	470KΩ	INF.	.1Ω	220Ω
9	6K6GT	0Ω	0Ω	80KΩ	80KΩ	470KΩ	INF.	.1Ω	220Ω
10	6K6GT	0Ω	0Ω	80KΩ	80KΩ	470KΩ	INF.	.1Ω	220Ω
11	5U4G	0Ω	80KΩ	.1Ω	90Ω	INF.	80Ω	90KΩ	80KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.



TRADE NAME	Howard, Model 482, 482A
MANUFACTURER	Howard Radio Co., 1735 Belmont Ave., Chicago, Ill.
TYPE SET	AC Operated FM Tuner with Self-Contained Power Supply
TUBES (SEVEN)	Types, 6BA6 RF Amp., 12AT7 or 6J6 Converter, 6BA6 1st IF Amp., 6BA6 2nd IF Amp., 6AL5 Ratio Det., 6J5 AF Amp., 6X5GT Rectifier.
POWER SUPPLY	110-120 Volts AC RATING .28 Amp. @ 117 Volts AC FREQ. MOD. 88-108MC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low freq. end of dial.

Use insulated alignment screwdriver for all adjustments.

IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1	.05 MFD	High side to Pin 1 (grid) of 6BA6 2nd IF Tube (4). Low side to chassis.	10.7MC (Unmodulated)	Tuning cap. fully closed.	DC probe to Point Ⓐ. Common to chassis.	A1	Turn A1 completely counter-clockwise. Adjust to first peak and adjust for maximum deflection.
2	.05 MFD	"	"	"	DC probe to Point Ⓑ. Common to chassis.	A2	Turn A2 completely counter-clockwise. Adjust for zero deflection. Repeat Steps 1 & 2 until no further improvement can be made.
3	.05 MFD	High side to Pin 7 (grid) of 12AT7. Low side to chassis.	"	"	DC probe to Point Ⓐ. Common to chassis.	A3,A4, A5,A6.	Adjust for maximum deflection. Recheck adjustment of A1. Repeat Step 2. Continue with RF Alignment in Step 4.

IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60 ∿ modulation and 450KC sweep. Use 120 ∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
1	.05 MFD.	High side to Pin 1 (grid) of 6BA6 1st IF Tube (3). Low side to chassis.	10.7MC (Freq. Mod.)	Tuning cap. fully closed.	Vertical input to Point Ⓒ. Ground to chassis.	A1, A3, A4.	Disconnect 10 MFD. cap. ⑨ from Point Ⓒ. Adjust A1, A3 & A4 for maximum amplitude, symmetry and coincidence of pattern per Fig. 1.
2	.05 MFD.	High side to Pin 7 (grid) of 12AT7. Low side to chassis.	"	"	"	A5,A6	Adjust for maximum amplitude, symmetry and coincidence of pattern per Fig. 1. Reconnect 10 MFD. cap. ⑨ to Point Ⓒ.
3	.05 MFD.	"	"	"	Vertical input to Point Ⓑ. Ground to chassis.	A2	Adjust for maximum straightness of crossover lines with crossover occurring at center of pattern per Fig. 2. Continue with RF Alignment in Step 4.

RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4	300Ω carbon res.	High side to ant. terminal "A". Low side to chassis. (Line ant. disconnected)	105MC	105MC	DC probe to Point Ⓐ. Common to chassis	A7	Turn A8 completely counter-clockwise. Adjust A7 for maximum deflection.
5	"	"	"	Tune for maximum deflection	"	A8,A9	Adjust for maximum deflection.
6	"	"	90MC	90MC	"	Osc. Coil (66)	Compress or expand coil slightly for maximum deflection.
7	"	"	"	Tune for maximum deflection	"	RF Coil (65) & Ant. Coil (64)	Compress or expand coil slightly for maximum deflection. Repeat Steps 4, 5, 6,& 7 until no further improvement can be made.

FIG. 1

FIG. 2

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DATE 10/48-#4818-12 SET #48-FOLDER #12

PARTS LIST AND DESCRIPTIONS

HOWARD MODELS 482, 482A

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: HOWARD PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	6BA6	6BA6	7BK	
2A	Converter	12AT7	12AT7		
B	"	6J6	6J6	7BF	
3	1st IF Amp.	6BA6	6BA6	7BK	
4	2nd IF Amp.	6BA6	6BA6	7BK	
5	Ratio Det.	6AL5	6AL5	6BT	
6	AF Amp.	6J5	6J5	6J	
7	Rectifier	6X5GT	6X5GT	6S	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: HOWARD PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
8A	50	150	CE-0007	AF888D	UP44415	DY-3x40-150	EL-340	Filter
B	30	150						"
C	30	150						Decoupling
9	10	50	CE-0028	PRS25/10	BR102A	M-10-25	TA-10	Stabilizing Cap.
10	.05	600		684-05	DT6S5	MPH-6-05	TC-15	Line Filter
11	.02	600		684-02	DT6S2	ST-6-02	TC-12	Audio Coup.
12	15	500	CC-0049	1468-00001	5W5Q1	MO.5-41	MS-415	Line Ant. Coup.-Cer.
13	5000	500	CC-0034	484-005	DT6D5	ST-6-005	TC-25	Audio Coupling- "
14	5000	500	CC-0034	484-005	DT6D5	ST-6-005	TC-25	" " "
15	250	500		1468-00025	5W5T25	MO.5-325	1FM-325	De-emphasis
16	5000	500	CC-0034	1467-005	1D5D5	MW.5-25	1FM-25	AVC Filter- "
17	300	500	CC-0028	1468-0003	5W5T3	MO.5-33	MS-33	RF Filter "
18	100	500	CC-0016	1469-0001	5R5T1	MOS.5-31	MS-31	Diode Load Cap.-Cer. Note 1
19	100	500	CC-0016	1469-0001	5R5T1	MOS.5-31	MS-31	"
20	5000	500	CC-0034	1467-005	1D5D5	MW.5-25	1FM-25	2nd IF Decoup.-Cer.
21	5000	500	CC-0034	1467-005	1D5D5	MW.5-25	1FM-25	2nd IF Cath. Byp.-Cer.
22	5000	500	CC-0034	1467-005	1D5D5	MW.5-25	1FM-25	2nd IF Grid Filter "
23	5000	500	CC-0034	1467-005	1D5D5	MW.5-25	1FM-25	1st IF Decoup. "
24	5000	500	CC-0034	1467-005	1D5D5	MW.5-25	1FM-25	AVC Filter "
25	5000	500	CC-0034	1467-005	1D5D5	MW.5-25	1FM-25	Conv. Decoupling "
26	30	500	CC-0005			MO.5-43	MS-43	Fixed Trimmer "
27	5000	500	CC-0034	1467-005	1D5D5	MW.5-25	1FM-25	AVC Filter "
28	5000	500	CC-0034	1467-005	1D5D5	MW.5-25	1FM-25	Filament Byp. "
29	5000	500	CC-0034	1467-005	1D5D5	MW.5-25	1FM-25	" " "
30	5000	500	CC-0034	1467-005	1D5D5	MW.5-25	1FM-25	Conv. Cathode Byp. "
31	5000	500	CC-0034	1467-005	1D5D5	MW.5-25	1FM-25	Osc. Feedback "
32	5000	500	CC-0034	1467-005	1D5D5	MW.5-25	1FM-25	" " -Note 2
33	50	500	CC-0014	1469-00005	5R5Q5	MOS.5-45	MS-45	Osc. Grid Cap.-Cer.
34	100	300		1469-0001	5R5T1	MOS.5-31	MS-31	" " " -Note 2 "
35	5	300		1469-000005	5R5V5	MOS.5-55	MS-55	Fixed Trimmer- "
36	70	500	CC-0022	1469-00007	5W5Q7	MOS.5-47	MS-47	RF Coupling-Cer.
37	5000	500	CC-0034	1467-005	1D5D5	MW.5-25	1FM-25	RF Screen Byp.-Cer.
38	5000	500	CC-0034	1467-005	1D5D5	MW.5-25	1FM-25	RF Cath. Byp.- "
39	50	500	CC-0014	1468-00005	5W5Q5	MO.5-45	1FM-45	Ant. Coupling "
40	5000	500	CC-0034	1467-005	1D5D5	MW.5-25	1FM-25	AVC Filter "

Note 1-When either Items #18 or 19 are replaced, replace both with capacitors of equal value.
Note 2-Used on chassis 482A.

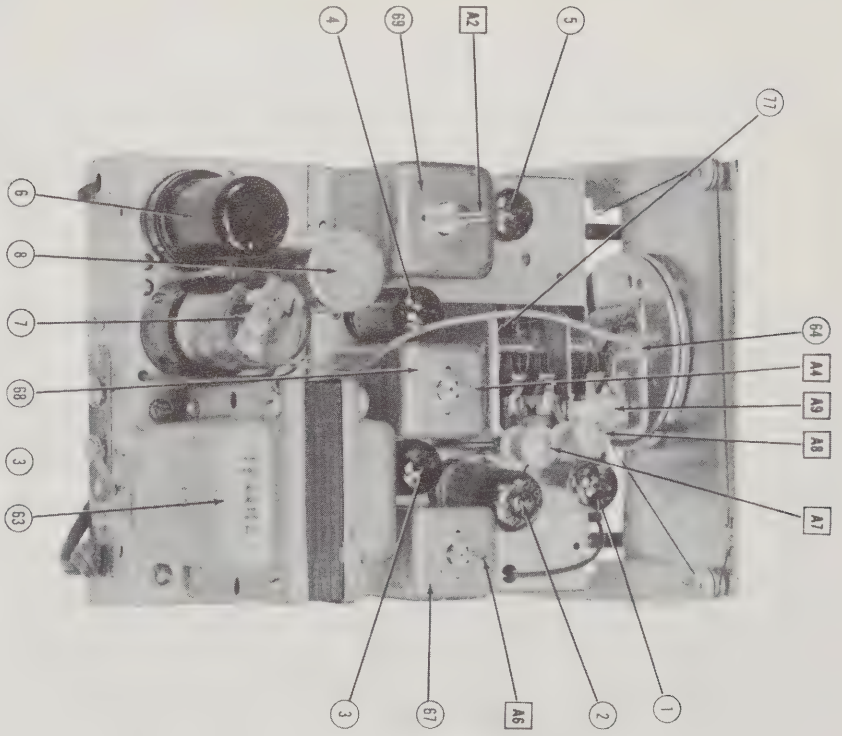
CONTROLS

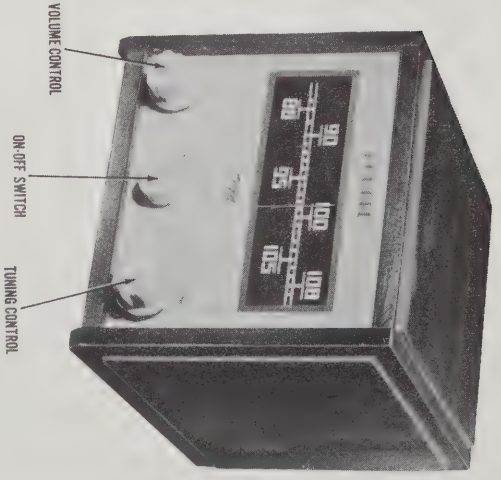
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: HOWARD PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
41A	500KΩ	½	VC-0009	D13-133	AM-60-Z	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 41A per instructions

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: HOWARD PART No.	IRC PART No.	IDENTIFICATION CODES
42	68Ω	½			Blue-Gray-Blk. RF Cathode
43	1200Ω	½		BTS-1200	Br.-Red-Red RF Decoup.
44	2200Ω	½		BTS-2200	Red-Red-Red Conv. Cathode-See Note 3

CHASSIS—TOP VIEW





PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	HOWARD PART No.	IRC PART No.	
45	2200Ω	½		BTS-2200	Red-Red-Red Conv. Plate Decoup.
46	10KΩ	½		BTS-10K	Br.-Blk.-Or. Osc. Grid
47	1200Ω	½		BTS-1200	Br.-Red-Red Osc. Plate Load-See Note 4
48	100KΩ	½		BTS-100K	Br.-Blk.-Yl. AVC Network
49	68Ω	½			Blue-Gray-Blk. 1st IF Cathode
50	2200Ω	½		BTS-2200	Red-Red-Red 1st IF Decoup.
51	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. 2nd IF Grid
52	68Ω	½			Blue-Gray-Blk. 2nd IF Cathode
53	2200Ω	½		BTS-2200	Red-Red-Red 2nd IF Decoupling
54	6800Ω	½		BTS-6800	Blue-Gray-Red Ratio Det. Diode Load
55	6800Ω	½		BTS-6800	Blue-Gray-Red " " " "
56	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
57	18KΩ	½		BTS-18K	Br.-Gray-Or. De-emphasis
58	10 Meg.	½		BTS-10 Meg.	Br.-Blk.-Blue AF Grid
59	220KΩ	½		BTS-220K	Red-Red-Yl. AF Plate Load
60	68KΩ	½		BTS-68K	Blue-Gray-Or. Filter
61	330Ω	1		BW-1-330	Or.-Or.-Br. "
62	4.3Ω	½		BW-½-4.3	Yl.-Or.-Gold Fil. Dropping
78	100KΩ	½		BTS-100K	Br.-Blk.-Yl. RF Grid

Note 3-This resistor is 220Ω ½ W. in Model 482A.
Note 4-Not used in Model 482A.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	HOWARD PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
63	117V AC @ .28A	142V AC .046A DC	6.2V AC @ 2.45A		TP-0012	P-6348*		

*Use on half of high voltage winding with suitable series resistor to reduce plate voltage.

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	HOWARD PART No.	MEISSNER PART No.	
64	Ant. Coil		0Ω	LA-0017		
65	RF Coil		0Ω	LR-0015		
66	Osc. Coil		0Ω	LO-0028§		§Model 482A uses osc. coil Part #LO-29.
67	1st IF	1Ω	.9Ω	LI-0037		
68	2nd IF	1Ω	1Ω	LI-0038		
69	FM Det. Trans.	1.1Ω	0Ω	LI-0039		
70	RF Plate Choke		1Ω	LC-0016		
71	Osc. Plate Choke		1Ω	LC-0016†		†Used only in Model 482A.
72	Fil. Choke		1.1Ω	LC-0014		
73	Line Choke		.2Ω	LC-0030		
74	" "		.2Ω	LC-0030		

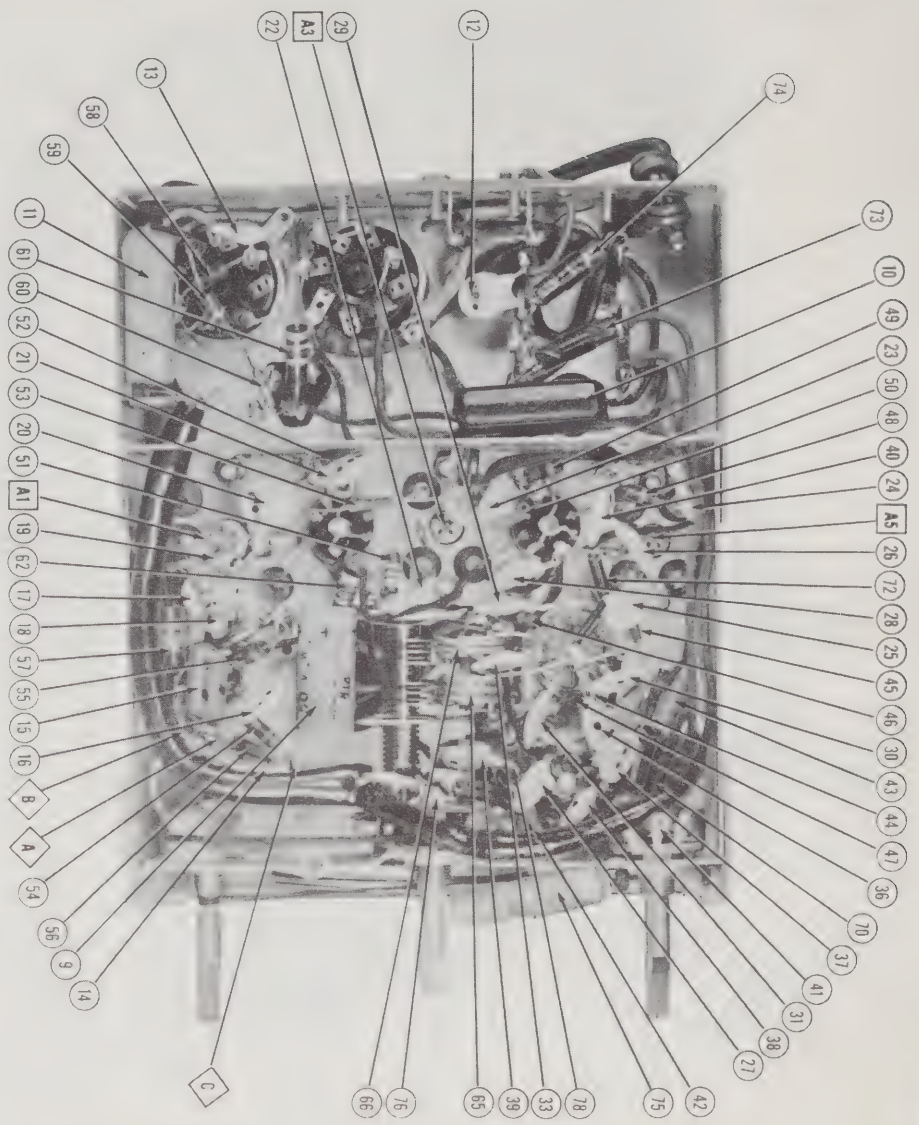
DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					HOWARD PART No.		
75	Bayonet	6-8	0.15	Brown	LS-0001		Type #47

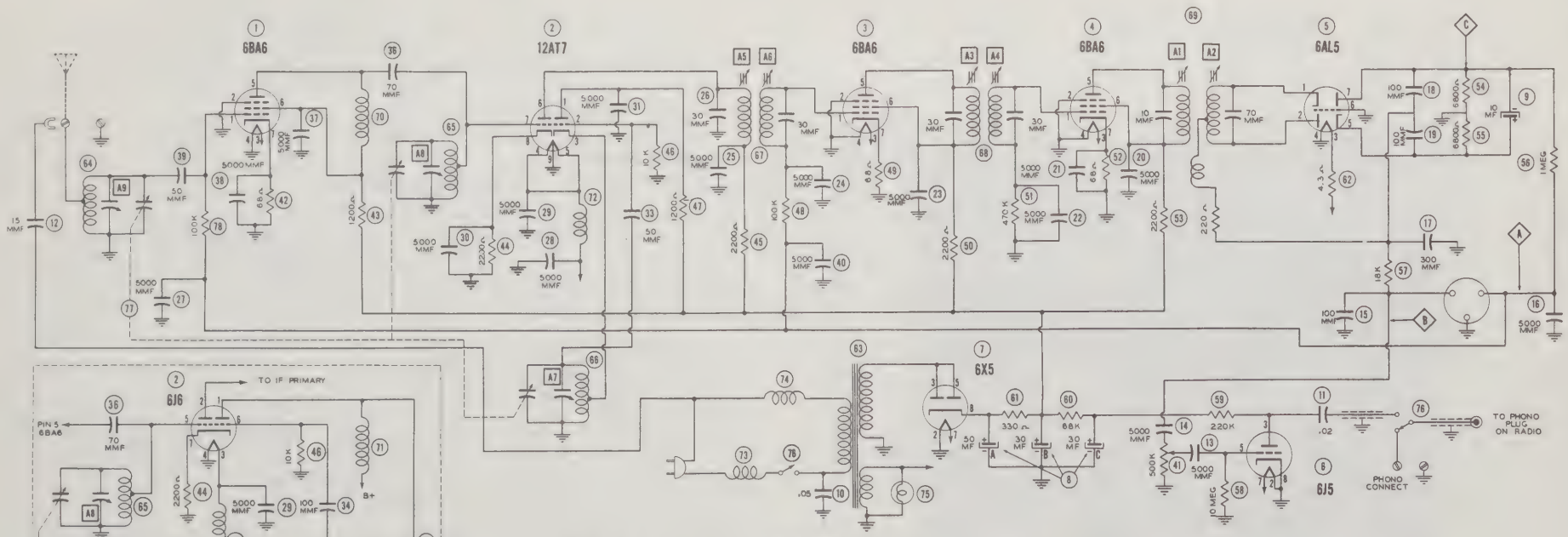
MISCELLANEOUS

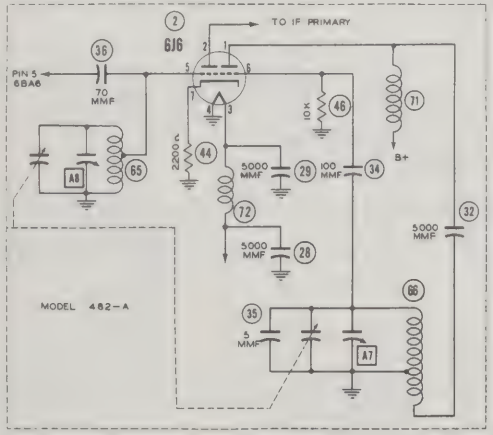
ITEM No.	PART NAME	HOWARD PART No.	NOTES
76	Switch	SW-0025	On-Off
77	3 Gang Var. Cap.	CV-0018	
	Dial Scale	DG-0021	
	Dial Pointer	HL-0003	
	Cabinet	CW-0012-1	Mahogany
	"	CW-0012-2	Blonde

CHASSIS—BOTTOM VIEW



HOWARD MODELS 482, 482A





IF = 10.7 MC

VOLTAGE READINGS

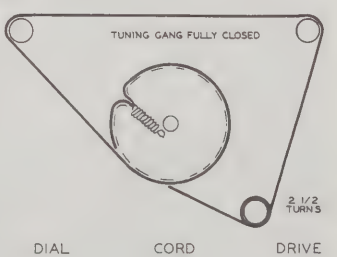
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
1	6BA6	0V.	0V.	6.2VAC	0V.	105VDC	105VDC	.8VDC	-	-
2	12AT7	115VDC	-1.5VDC§	0V.	6.2VAC	6.2VAC	115VDC	0V.	5VDC	0V.
3	6BA6	0V.	0V.	6.2VAC	0V.	90VDC	90VDC	.8VDC	-	-
4	6BA6	0V.	0V.	6.2VAC	0V.	100VDC	90VDC	.8VDC	-	-
5	6AL5	0V.	0V.	4.7VAC	0V.	.5VDC	0V.	4.7VDC	-	-
6	6J5	0V.	0V.	105VDC	0V.	0V.	0V.	6.2VAC	0V.	-
7	6X5GT	0V.	0V.	142VAC	0V.	142VAC	0V.	6.2VAC	138VDC	-

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
1	6BA6	1.1 Meg.	0Ω	1Ω	0Ω	0Ω	0Ω	0Ω	-	-
2	12AT7	0Ω	0Ω	10Ω	1Ω	1Ω	0Ω	0Ω	2.2KΩ	0Ω
3	6BA6	1.1 Meg.	0Ω	1Ω	0Ω	0Ω	0Ω	0Ω	-	-
4	6BA6	470KΩ	0Ω	1Ω	0Ω	0Ω	0Ω	0Ω	-	-
5	6AL5	INF.	INF.	0Ω	0Ω	0Ω	0Ω	0Ω	-	-
6	6J5	0Ω	0Ω	0Ω	0Ω	10 Meg.	INF.	1Ω	0Ω	-
7	6X5GT	0Ω	0Ω	140Ω	INF.	140Ω	INF.	1Ω	0Ω	-

RESISTANCE READINGS IN THE B- CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE



1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - No signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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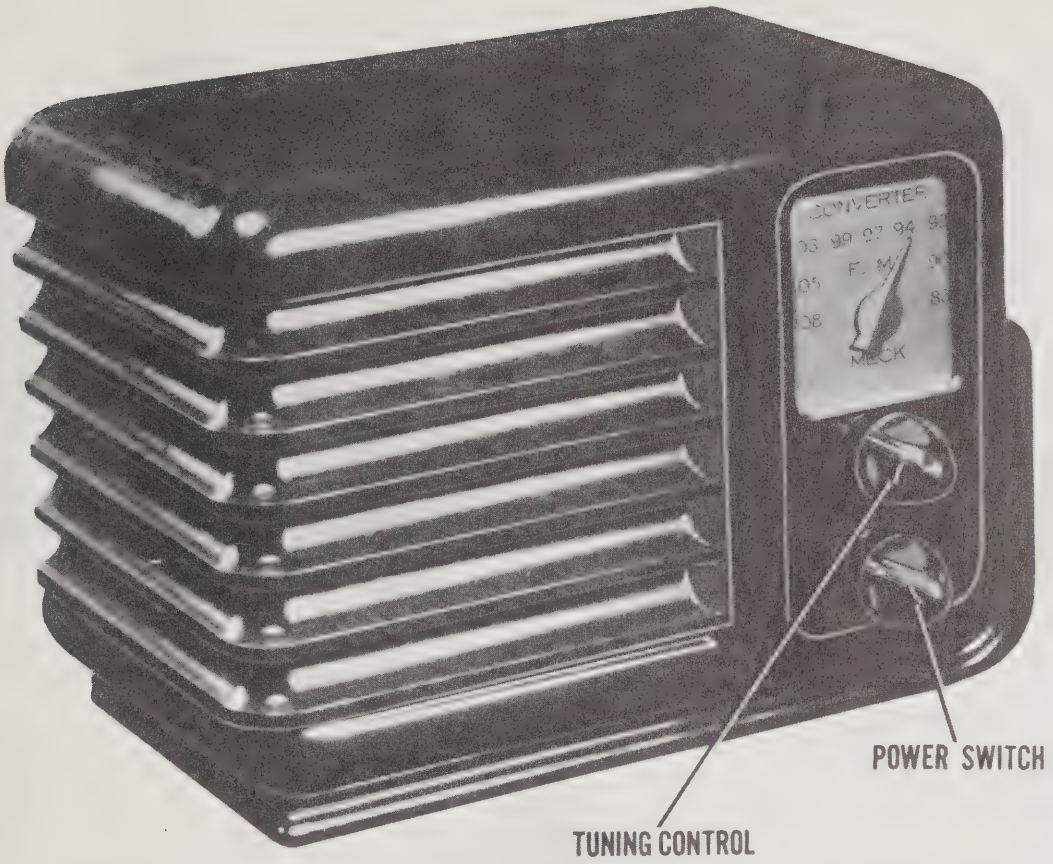
4818-12

MECK
MODEL CX500



MECK
MODEL CX500

MECK MODEL CX500

TRADE NAME	Meck, Model CX500
MANUFACTURER	John Meck Industries, Plymouth, Indiana
TYPE SET	AC-DC Operated FM Tuner with Self-Contained Power Supply
TUBES (TWO)	Types, 7F8 FM Det.-IF, 6H6 Rectifier (Early production)
(THREE)	Types, 14F8 FM Det.-IF, 12AT6 AF Amp., 35W4 Rectifier (Late production)
POWER SUPPLY	110-120 Volts AC-DC
TUNING RANGE—FREQ. MOD.	88-108MC RATING .14 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer parallel with base of dial.
Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.
An AM or FM signal generator may be used.
Use insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.01 MFD	High side to Pin 1 (grid) 14F8 OR7F8. Low side to B-.	21.75MC (30% Mod.)	108MC	Across voice coil of rec'r. speaker.	A1	Adjust for maximum output.
2	300Ω carbon res.	High side to terminal 1 of ant. terminal board. Low side to chassis.	105MC (30% Mod.)	105MC	"	A2	Adjust for maximum output.
3	"	"	"	Tune for maximum output.	"	A3	Rock tuning cap. and adjust for maximum output.

HOWARD W. SAMS & CO., INC. **indianapolis . . Indiana**

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PARTS LIST AND DESCRIPTIONS

MECK MODEL 2V5U

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		MECK PART No.	STANDARD REPLACEMENT		
1A	FM-Det.-IF	14F8	14F8	8BW	Used in Late Production
B	FM-Det.-IF	7F8	7F8	8BW	Used in Early Production
2	AF Amp.	12AT6	12AT6	7BT	Used in Late Production
3A	Rectifier	35w4	35W4	5BQ	Used in Late Production
B	Rectifier	6H6	6H6	7Q	Used in Early Production

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	MECK PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
4A	50	150	CLP-10007	PRSA150-30-50	EZ532150	DSB-5030-150	TA-530	Filter-Green
B	30	150						" -Red
5	8	25	CLP-10011	PRS150-8	BR815	M-8-150	UT-81	Stabilizing Cap.
6	.01	200	CPP-12103	484-01	DT4S1	MPH-4-01	TC-11	Rectifier Bypass
7	.02	200	CPP-12203	484-02	DT4S2	ST-4-02	TC-12	Audio Coupling
8	.01	200	CPP-12103	484-01	DT4S1	ST-4-01	TC-11	" " -See Note 1
9	.001	600	CPP-12102	684-001	DT6D1	ST-6-001	TC-21	De-emphasis
10	.0025	200	CPP-12522	484-002	DT6D2	ST-6-002	TC-22	Quench Network-See Note 2
11	.005	600	CPP-12502	684-005	DT6D5	ST-6-005	TC-25	RF Bypass
12	.2	200	CPP-12200	484-.2	DT4P2	ST-2-2	TC-2	Line Isolation
13	.05	400		484-05	DT4S5	ST-4-05	TC-15	AF Cathode Byp.-See Note 1
14	100		CC-15101	1468-0001	5W5T1	MO.5-31	1FM-31	Ant. Coupling-See Note 1
15	30		CC-15300		5W5Q3	MO.5-43	MS-43	Regenerative Feedback
16	30		CC-15300		5W5Q3	MO.5-43	MS-43	" "
17	500		CC-15501	1468-0005	5W5T5	MO.5-35	1FM-35	RF Bypass
18	2		CC-1520					RF Coupling
19	2		CC-1520					Osc. Coupling
20	20		CC-15200		5W5Q2	MOS.5-42	MS-42	Osc. Grid Cap.
21	100		CC-15101	1468-0001	5W5T1	MO.5-31	1FM-31	Filament Byp.-Note 3
22	500		CC-15501	1468-0005	5W5T5	MO.5-35	1FM-35	RF Bypass-Note 1
23	500		CC-15501	1468-0005	5W5T5	MO.5-35	1FM-35	Osc. Feedback

*Omit bypass section.

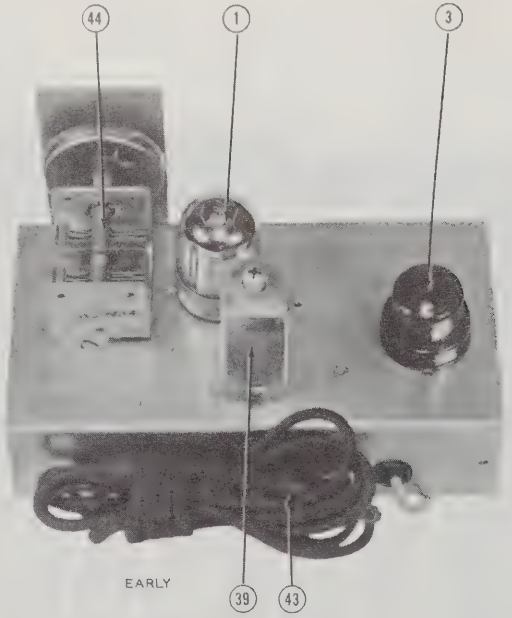
Note 1-Used in late production only.
Note 2-Some models use .002 MFD. in this application.
Note 3-Used in early production only.

RESISTORS

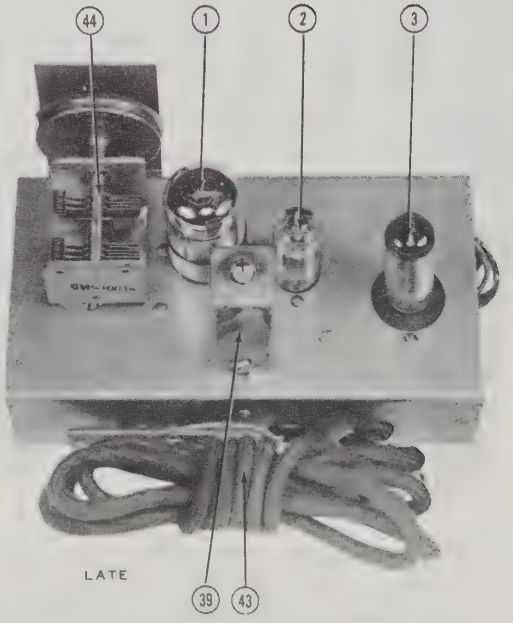
ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	MECK PART No.	IRC PART No.	
24	100Ω	1/3	RC-21000	BW-½-100	Br.-Blk.-Br. Isolation
25	1500Ω	1/3	RC-21501	BTS-1500	Br.-Grn.-Red Quench Network
26	22KΩ	1/3	RC-22202	BTS-22K	Red-Red-Or. Converter Cathode
27	150KΩ	1/3	RC-21503	BTS-150K	Br.-Grn.-Yl. Voltage Dropping
28	100KΩ	1/3	RC-21003	BTS-100K	Br.-Blk.-Yl. De-emphasis
29	68KΩ	1/3	RC-26802	BTS-68K	Blue-Gray-Or. IF Coil Shunt
30	22KΩ	1/3	RC-22202	BTS-22K	Red-Red-Or. Oscillator Grid
31	100Ω	1/3	RC-21000	BW-½-100	Br.-Blk.-Br. Oscillator Plate Decoupling
32	100KΩ	1/3	RC-21003	BTS-100K	Br.-Blk.-Yl. AF Plate Load-See Note
33	470KΩ	1/3	RC-24703	BTS-470K	Yl.-Vi.-Yl. AF Grid-See Note
34	6800Ω	1/3	RC-26801	BTS-6800	Blue-Gray-Red AF Cathode-See Note
35	2000Ω	1/3	RC-22001	BTS-2200	Red-Blk.-Red Filter
36	1000Ω	1/3	RC-21001	BTS-1000	Br.-Blk.-Red Surge Limiter

Note-Not used in early prodcution.

CHASSIS—TOP VIEW



EARLY



LATE

PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA MECK PART No.	REPLACEMENT DATA MEISSNER PART No.	
37	FM Ant. Coil		0Ω	TRFP-10009		
38	FM Osc. "		0Ω	TRCP-10010		
39	Input IF FM	.6Ω	3Ω	TSP-10016		
40	RF Choke		2Ω	LG-10002		
41	" "	0Ω	0Ω	LG-10001		Late Production only

MISCELLANEOUS

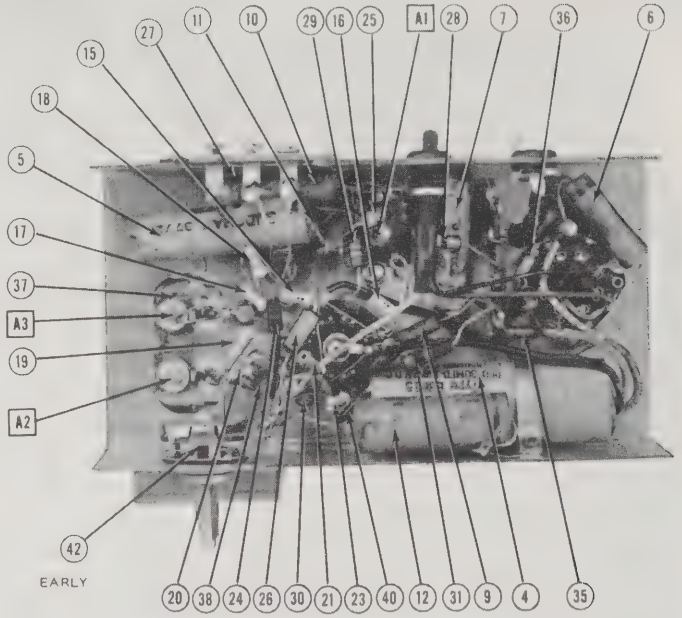
ITEM No.	PART NAME	MECK PART No.	NOTES
42	Switch		On-Off
43A	Res. Line Cord		350Ω (Early production)
B	" " "	WP-10003	390Ω (Late production)
44	2 Gang Var.Cap.	CVP-10014	

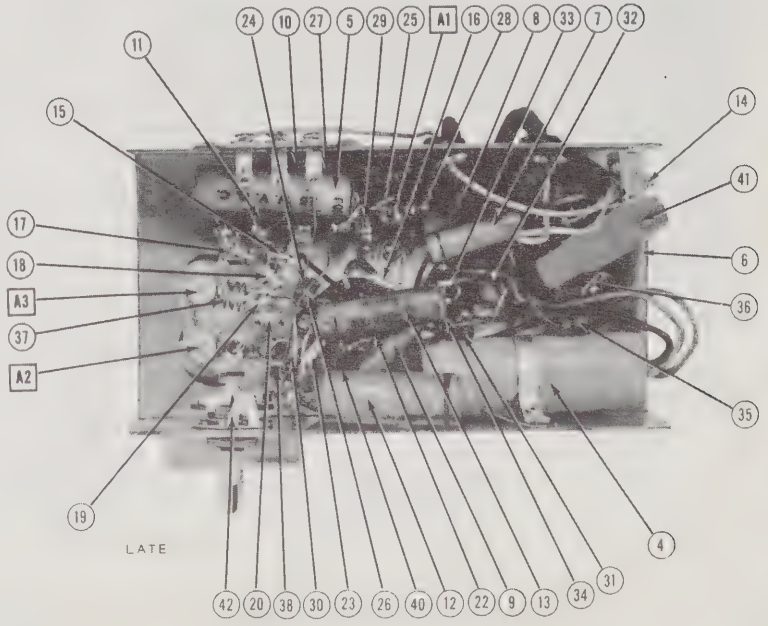
N O T E: Terminal #3 on back of chassis used only - with AC radio receivers or amplifiers; or with AC-DC receivers that are so wired that the B- does not connect to the chassis. Under these conditions connect terminal #2 to terminal #3 with a short piece of wire to minimize hum pick-up.

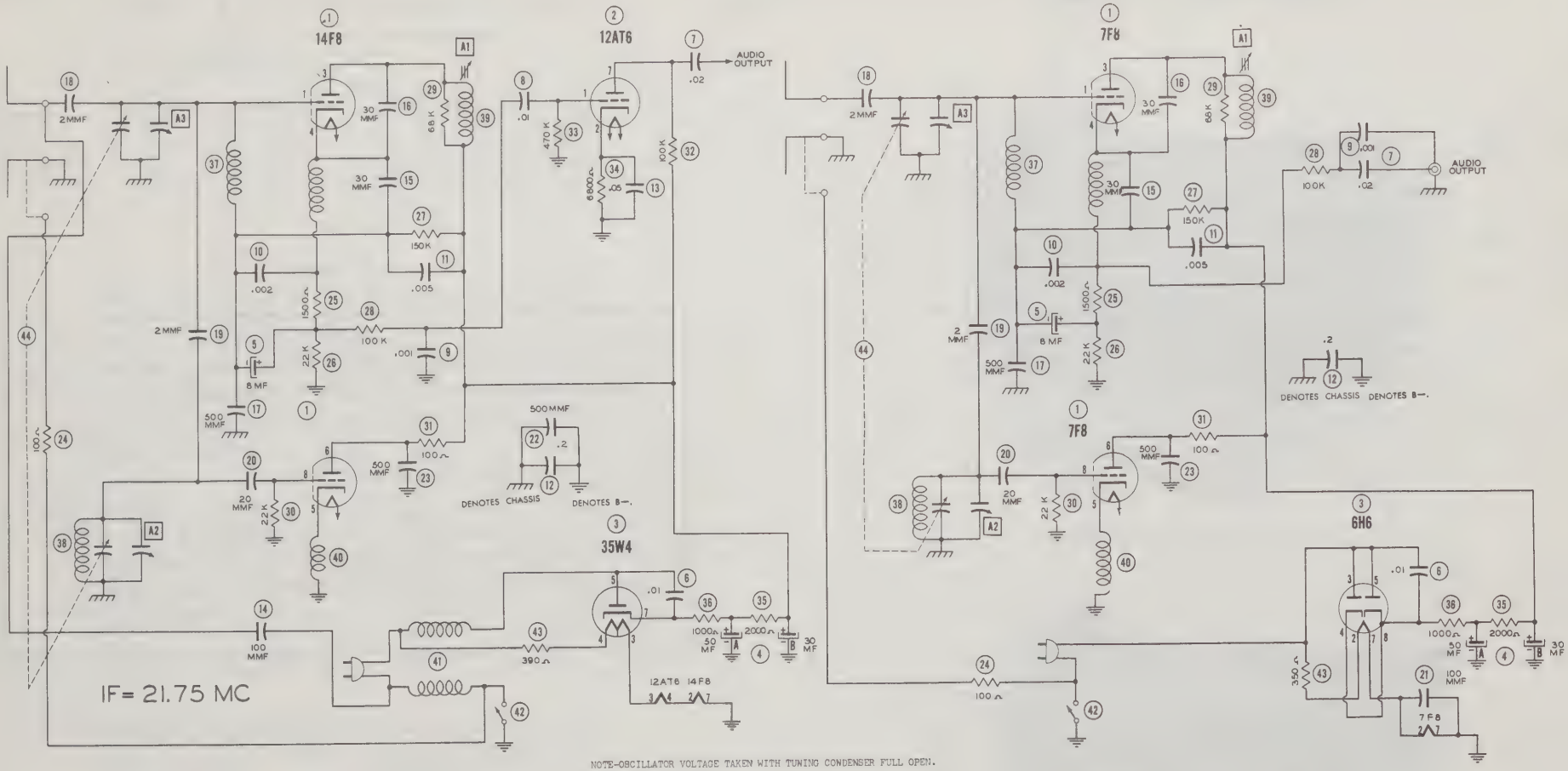
Disconnect any ground wire to the receiver or connect through a .01 MFD capacitor.

The resistor (Item 24) (100 ohms 1/3 Watt connected from terminal #3 to the AC switch) is a protective resistor and acts as a fuse that will burn out if the converter is incorrectly connected to the radio receiver.

CHASSIS—BOTTOM VIEW







NOTE-OSCILLATOR VOLTAGE TAKEN WITH TUNING CONDENSER FULL OPEN.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	14F8	36VDC	11.5VAC	107VDC	60VDC	0V.	110VDC	0V.	-2.6VDC§
2	12AT6	0V.	1.4VDC	23.5VAC	11.5VAC	0V.	0V.	90VDC	-
3	35W4	140VDC	0V.	23.5VAC	55VAC	117VAC	47VAC	152VDC	-

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	14F8	200KΩ	11.5Ω	50KΩ	28KΩ	1.6Ω	50KΩ	0Ω	20KΩ
2	12AT6	50KΩ	7KΩ	23.5Ω	11.5Ω	0Ω	0Ω	150KΩ	-
3	35W4	50KΩ	0Ω	23.5Ω	57Ω	500Ω	52Ω	50KΩ	-

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	7F8	25VDC	6.8VAC	100VDC	50VDC	0V.	105VDC	0V.	12.6VDC
2	6H6	0V.	14VAC	117VAC	125VDC	117VAC	116VDC	6.8VAC	125VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	7F8	200KΩ	3Ω	60KΩ	23KΩ	1Ω	60KΩ	0Ω	20KΩ
2	6H6	INF.	7.5Ω	3.0Ω	60KΩ	310Ω	60KΩ	3Ω	60KΩ

RESISTANCE READINGS IN THE B- CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

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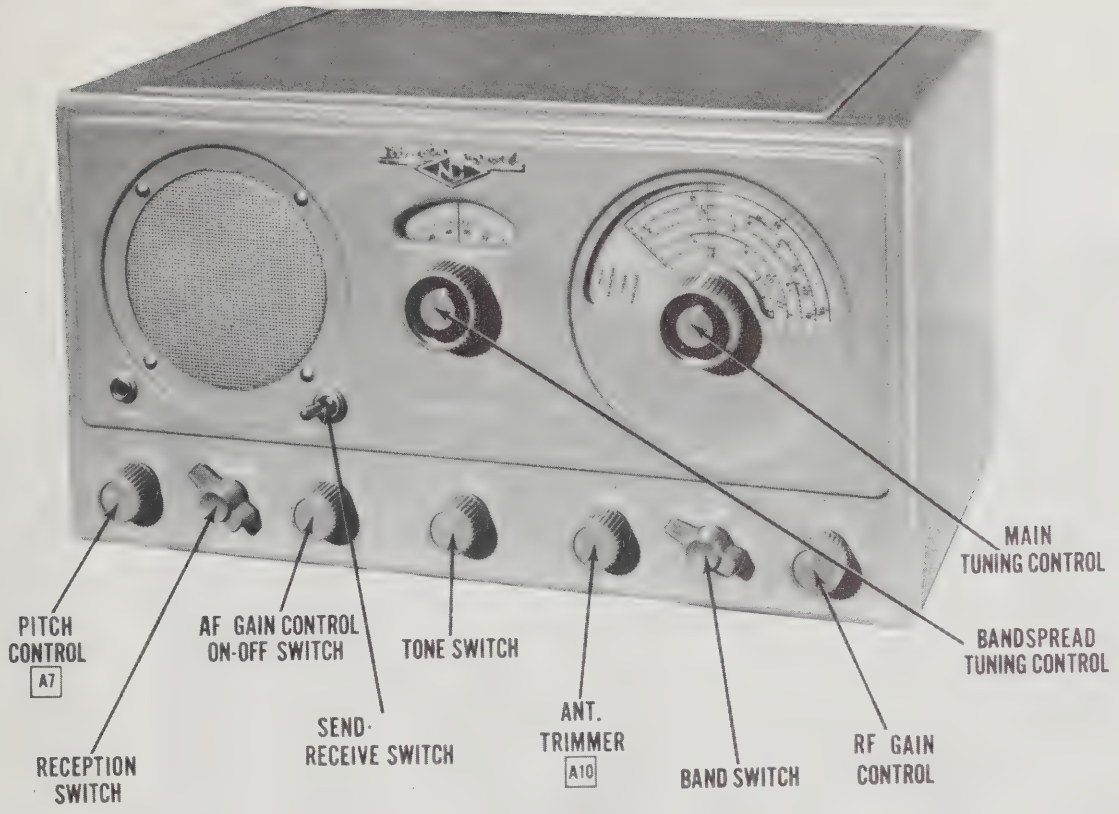
4818-13

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - No signal applied for voltage measurements.

NATIONAL MODEL
NC-57



NATIONAL MODEL NC-57

TRADE NAME	National, Model NC-57
MANUFACTURER	National Co., Inc., 61 Sherman St., Malden, Mass.
TYPE SET	AC or Battery Operated Multi-Band Commercial Type Superheterodyne Receiver
TUBES (NINE)	Types, 6SG7 RF Amp., 6SB7Y Converter, 6SG7 1st IF Amp., 6SG7 2nd IF Amp., 6H6 Det.-AVC-ANL, 6SL7GT AF Amp.-BFO, 6V6GT Power Output, OD3/VR-150 Voltage Reg., 5Y3GT Rectifier.
POWER SUPPLY	105-130 Volts AC or 6.3 Volts & 250 Volts DC RATING .67 Amp. @ 117V AC
TUNING RANGE-BROADCAST	560-1550KC SHORT WAVE Band "A" 35.0-54.0MC, Band "B" 12.0-35.0MC, Band "C" 4.4-12.0MC, Band "D" 1.55-4.4MC

DISASSEMBLY INSTRUCTIONS

1. Remove the top and back piece of the cabinet by releasing the ten drive screws at the back which fasten the piece to the chassis and cabinet wrap around.
2. Remove the bottom cover of the receiver which is held in place by four drive screws.
3. Remove the four mounting feet at the bottom of the receiver. These feet are fastened by means of a screw and speed nut arrangement.
4. Unsolder the two loudspeaker leads to the output tube (6V6GT/G). A red lead is soldered to Pin 4 and a blue lead to Pin 3.
5. Remove all knobs from the front of the Receiver. All knobs, with the exception of the main tuning and bandspread tuning knobs, are mounted on flatted shafts by set screws. Replacing the knobs to their original position is assured by use of the flatted shafts.
6. Remove the retaining nuts on the control switch, BAND switch, bandspread tuning control, main tuning control and the SEND-REC switch.

After completing the six steps above, the chassis can be withdrawn from the cabinet. Reassembly of the receiver can be accomplished by following the disassembly procedure in reverse order.

HOWARD W. SAMS & CO., INC. **Indianapolis Indiana**

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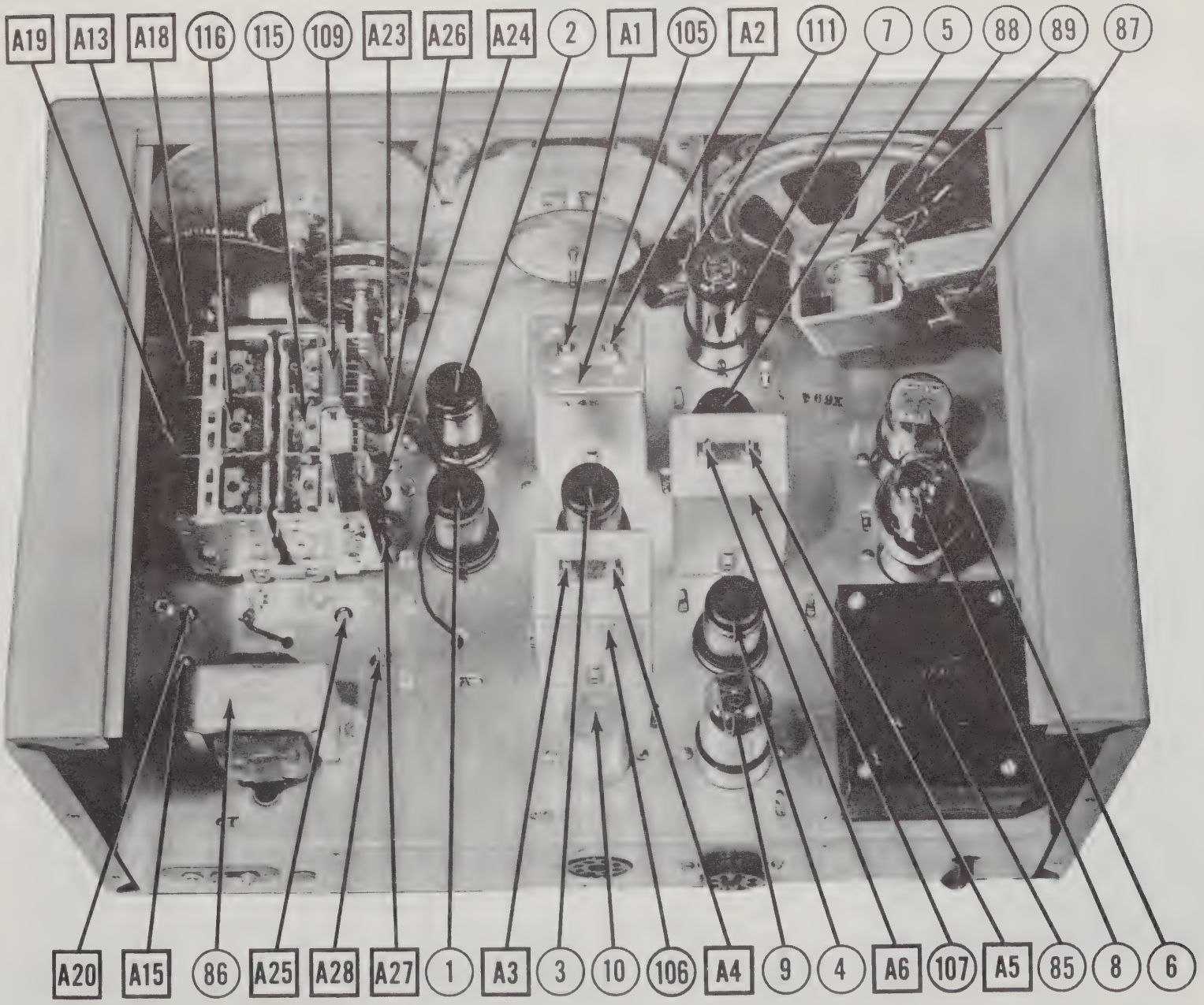
DATE 10/48-#4818-14 SET #48-FOLDER #14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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: NATIONAL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	6SG7	6SG7	8 K	
2	Converter	6SB7Y	6SB7Y	8R	
3	1st IF Amp.	6SG7	6SG7	8BK	
4	2nd IF Amp.	6SG7	6SG7	8BK	
5	Det.-AVC-ANL	6H6	6H6	7Q	
6	AF Amp.-BFO	6SL7GT	6SL7GT	8BD	
7	Power Output	6V6GT	6V6GT	7AC	
8	Voltage Reg.	OD3/VR-150	OD3/VR-150	4AJ	
9	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: NATIONAL PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
10A	10	450		AF22J	UP1145	DY-2x10-450	EL-210	▲ Filter
B	10	450						■ "
11	25	50		PRS50/25	BR255	M-25-50	TA-525	Cathode Bypass
12	20	25		PRS25/25	BR202A	M-25-25	TA-25	" "
13	.01	600		684-01	DT6S1	MPH-6-01	TC-11	Line Filter
14	.01	400		484-01	DT4S1	ST-4-01	TC-11	Voltage Reg. Bypass
15	.1	400		484-.1	DT4P1	ST-4-1	TC-1	Tone Comp.
16	.01	400		484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
17	.01	600		684-01	DT6S1	ST-6-01	TC-11	" "
18	.01	300		484-01	DT4S1	ST-4-01	TC-11	BFO Coupling
19	.1	400		484-.1	DT4P1	ST-4-1	TC-1	Limiter Filter
20	.01	400		484-01	DT4S1	ST-4-01	TC-11	2nd IF Screen Bypass
21	.1	400		484-.1	DT4P1	ST-4-1	TC-1	2nd IF Cathode Byp.
22	.01	400		484-01	DT4S1	ST-4-01	TC-11	AVC Filter
23	.01	400		484-01	DT4S1	ST-4-01	TC-11	" "
24	.01	600		684-01	DT6S1	ST-6-01	TC-11	1st IF Plate Decoup.
25	.01	600		684-01	DT6S1	ST-6-01	TC-11	1st IF Screen Bypass
26	.1	400		484-.1	DT4P1	ST-4-1	TC-1	1st IF Cathode Bypass
27	.01	600		684-01	DT6S1	ST-6-01	TC-11	AVC Filter
28	.01	600		684-01	DT6S1	ST-6-01	TC-11	Conv. Plate Decoup.
29	.01	400		484-01	DT4S1	ST-4-01	TC-11	Conv. Screen Bypass
30	.1	400		484-.1	DT4P1	ST-4-1	TC-1	RF Bypass
31	.01	400		484-01	DT4S1	ST-4-01	TC-11	RF Screen Bypass
32	.01	400		484-01	DT4S1	ST-4-01	TC-11	RF Cathode Bypass
33	2200	500		1467-002	1W5D2	MW.5-22	1FM-22	Output Plate Byp.-Note
34	1000	500		1467-001	1W5D1	MW.5-21	1FM-21	Audio Coupling
35	300	500		1468-003	5W5T3	MO.5-33	1FM-33	AF Plate Bypass
36	100	500		1468-0001	5W5T1	MO.5-31	1FM-31	Diode RF Filter
37	270	500		1468-00025	5W5T25	MO.5-325	1FM-325	BFO Grid Cap.
38	220	500						Fixed Trimmer
39	100	500		1468-0001	5R5T1	MOS.5-31	MS-31	Osc. Grid Cap.
40	100	500		1469-0001	5R5T1	MOS.5-31	MS-31	Fixed Padder
41	510	500						" "
42	1300	500						" "
43	4300	500						" "
44	5	300		1468-000005	5W5V5	MO.5-55	MS-55	RF Coupling-Cer.
45	5	300		1468-000005	5W5V5	MO.5-55	MS-55	" " "
46	100	500		1468-0001	5W5T1	MO.5-31	1FM-31	Fixed Padder
47	1000	500		1467-001	1D5D1	MW.5-21	1FM-21	RF Plate Decoup.
48	100	500		1468-0001	5W5T1	MO.5-31	1FM-31	RF Coupling
49	100	500		1469-0001	5R5T1	MO.5-31	1FM-31	Fixed Padder
50	10000	300		1467-01	1D3S1	MW.3-11	1FM-11	AVC Filter

Note-Not used in all models.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: NATIONAL PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
51A	500KΩ	½		D13-133	M-60-Z	AF Gain Control
B	Shaft			A	Not Req.	Attach to 51A per instructions
C	Switch			41	SW-A	" " " "
52	10KΩ	2			43-10M	RF Gain Control

PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	REPLACEMENT DATA: NATIONAL PART No.	REPLACEMENT DATA: MEISSNER PART No.
	Band				
90	Ant.Coil E	2.5Ω	5.2Ω		
91	" " D	1Ω	1.5Ω		
92	" " C	1Ω	0Ω		
93	" " B	0Ω	0Ω		
94	" " A	0Ω	0Ω		
95	RF Coil E	.5Ω	5.2Ω		
96	" " D	26.2Ω	1.5Ω		
97	" " C	5Ω	0Ω		
98	" " B	2.2Ω	0Ω		
99	" " A	0Ω	0Ω		
100	Osc.Coil E		2Ω		
101	" " D		.5Ω		
102	" " C		0Ω		
103	" " B		0Ω		
104	" " A		0Ω		
105	1st IF	2.2Ω	1Ω		
106	2nd IF	2Ω	2Ω		
107	3rd IF	2Ω	2Ω		
108	B.F. Osc. Coil		4.8Ω		

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: NATIONAL PART No.	REPLACEMENT DATA:	INSTALLATION NOTES
109	Bayonet	6-8	0.15	Brown			Type #47

MISCELLANEOUS

ITEM No.	PART NAME	NATIONAL PART No.	NOTES
110	Switch		Band
111	"		Send-Receive
112	"		Tone
113	"		Control
114	Var. Cap.		ALO
115	3 Gang Var.Cap.		Band Spread
116	" " " "		Main Tuning

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	NATIONAL PART No.	IRC PART No.	
53	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
54	150KΩ	½		BTS-150K	Br.-Grn.-Yl. RF Grid
55	220Ω	½			Red-Red-Br. RF Cathode
56	1000Ω	½		BTS-1000	Br.-Blk.-Red RF Screen
57	4700Ω	½		BTS-4700	Yl.-Vi.-Red RF Plate Decoup.
58	68KΩ	2		BT-2-68K	Blue-Gray-Or. Voltage Dropping
59	33Ω	½			Or.-Or.-Blk. Parasitic Suppressor
60	47KΩ	½		BTS-47K	Yl.-Vi.-Or. Osc. Grid
61	3900Ω	½		BTS-3900	Or.-White-Red Conv. Screen
62	1000Ω	½		BTS-1000	Br.-Blk.-Red Conv. Plate Decoup.
63	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AVC Network
64	1200Ω	½		BTS-1200	Br.-Red-Red 1st IF Cathode
65	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. 1st IF Screen
66	1000Ω	½		BTS-1000	Br.-Blk.-Red 1st IF Plate Decoup.
67	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AVC Network
68	220Ω	½			Red-Red-Br. 2nd IF Cathode
69	2200Ω	½		BTS-2200	Red-Red-Red 2nd IF Screen
70	2200Ω	½		BTS-2200	Red-Red-Red Series "S" Meter
71	2.2 Meg.	½		BTS-2.2 Meg.	Red-Red-Grn. AVC Network
72	100KΩ	½		BTS-100K	Br.-Blk.-Yl. Diode Load
73	220KΩ	½		BTS-220K	Red-Red-Yl. " "
74	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. ANL Network
75	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. " "
76	10KΩ	½		BTS-10K	Br.-Blk.-Or. CWO Osc. Plate
77	10KΩ	½		BTS-10K	Br.-Blk.-Or. CWO Osc. Grid
78	2700Ω	½		BTS-2700	Red-Vi.-Red AF Cathode
79	100KΩ	½		BTS-100K	Br.-Blk.-Yl. AF Plate Load
80	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. Output Grid
81	330Ω	2		BW-2-330	Or.-Or.-Br. Output Cathode
82	4700Ω	½		BTS-4700	Yl.-Vi.-Red Tone Comp.
83	22KΩ	½		BTS-22K	Red-Red-Or. Output Trans. Primary Shunt
84	3900Ω	10		AB-4000	Voltage Dropping-See Note

Note-Some models use two 1800Ω 2 W. resistor in series in this application.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	NATIONAL PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
85	117V AC @ .67A	620V CT .1A DC	5.3V AC @ 2.0A	6.8V AC @ 2.35A	K-316	P-6333	T22R04	P-2952#

#Drill new mounting holes

FILTER CHOKE

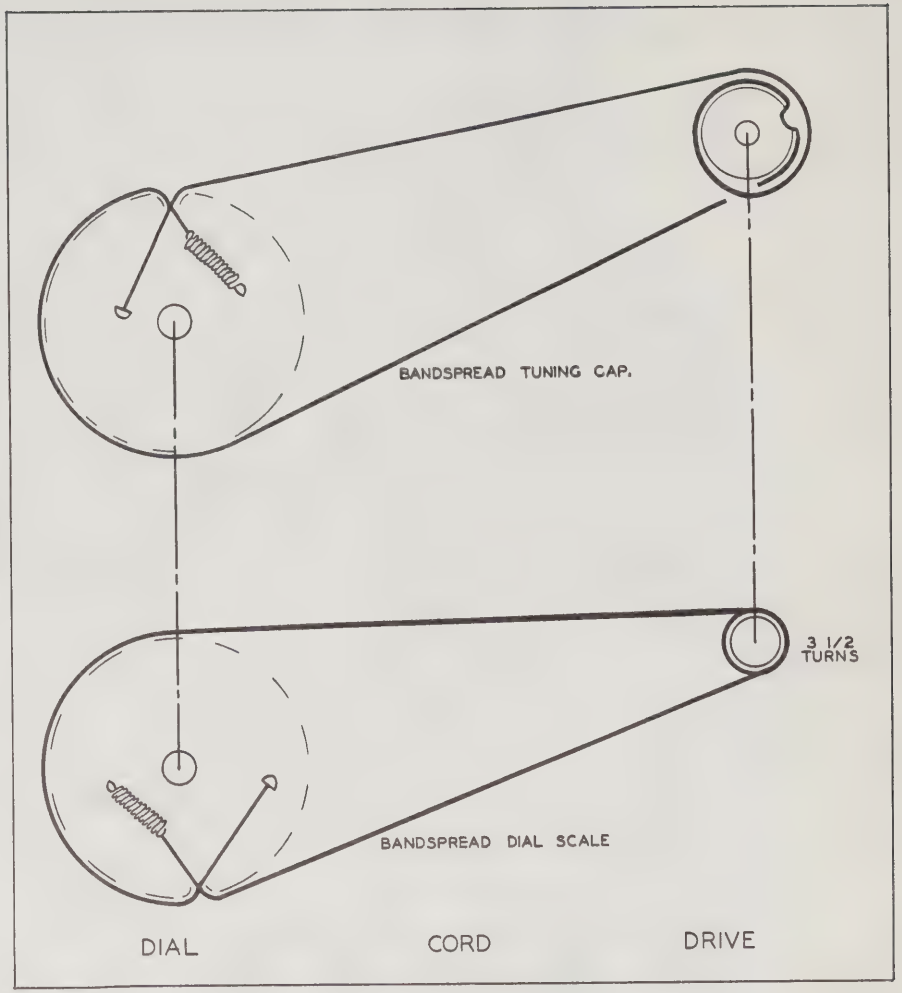
ITEM NO.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 Cy)	NATIONAL PART NO.	STANCOR PART NO.	THORDARSON PART NO.	MERIT PART No.	
86	.1 A.	265Ω	8 Henries	K-317	C-1701	T-20053		

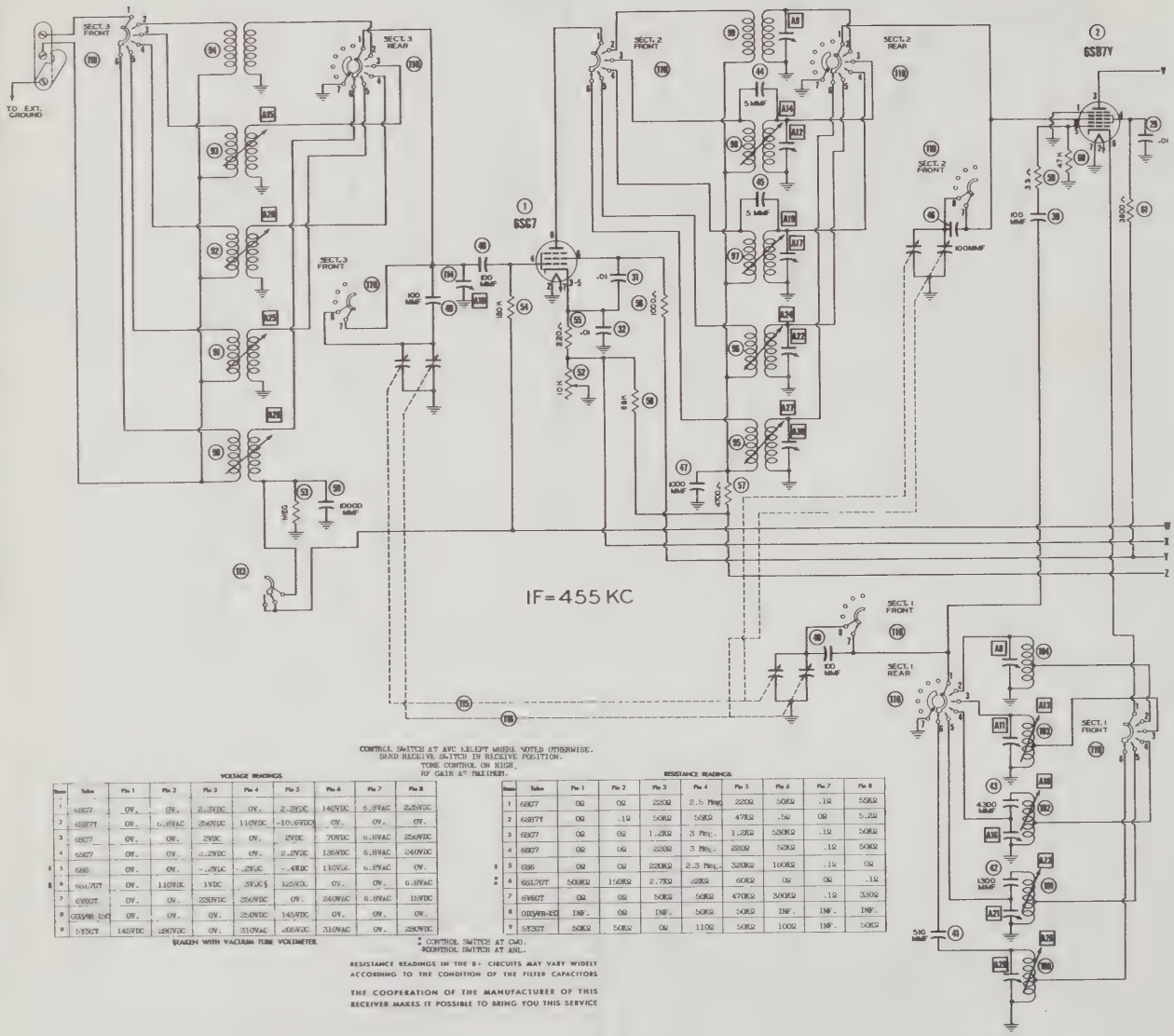
TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		NATIONAL PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
87	4000Ω	3.4Ω	600Ω	.4Ω	NE-139	A-3850	T22S46	A-2930	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			NATIONAL PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.		ST-107		
88	PM	3.4Ω		Mod. P5-V	5A15	
	CONE DIA.	VC DIA.				
89	4-5/8"	9/16"				





CONTROL SWITCH AT AFC EXCEPT WHERE NOTED OTHERWISE.
BAND RECEIVE SWITCH IN RECEIVE POSITION.
TONE CONTROL ON HIGH.
RF GAIN AT MAXIMUM.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6SG7	0V.	0V.	2.3VDC	0V.	2.3VDC	140VDC	6.8VAC	225VDC
2	6SB7Y	0V.	6.8VAC	250VDC	110VDC	-10.6VDC	0V.	0V.	0V.
3	6SG7	0V.	0V.	2VDC	0V.	2VDC	70VDC	6.8VAC	250VDC
4	6SG7	0V.	0V.	2.2VDC	0V.	2.2VDC	135VDC	6.8VAC	240VDC
4	5	6J6	0V.	0V.	-.4VDC	-.2VDC	-.4VDC	110VDC	6.8VAC	0V.
6	6	6SL7GT	0V.	110VDC	1VDC	3VDC§	125VDC	0V.	0V.	6.8VAC
	7	6V6GT	0V.	0V.	250VDC	250VDC	0V.	240VDC	6.8VAC	15VDC
	8	0D3/VR 150	0V.	0V.	0V.	250VDC	145VDC	0V.	0V.	0V.
	9	5Y3GT	145VDC	280VDC	0V.	310VAC	400VDC	310VAC	0V.	280VDC

TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6SG7	0Ω	0Ω	220Ω	2.5 Meg.	220Ω	50KΩ	.1Ω	55KΩ
2	6SB7Y	0Ω	.1Ω	50KΩ	55KΩ	47KΩ	.1Ω	0Ω	5.2Ω
3	6SG7	0Ω	0Ω	1.2KΩ	3 Meg.	1.2KΩ	330KΩ	.1Ω	50KΩ
4	6SG7	0Ω	0Ω	220Ω	3 Meg.	220Ω	52KΩ	.1Ω	50KΩ
4	5	6J6	0Ω	0Ω	220KΩ	2.3 Meg.	320KΩ	100KΩ	.1Ω	0Ω
6	6	6SL7GT	500KΩ	150KΩ	2.7KΩ	22KΩ	60KΩ	0Ω	0Ω	.1Ω
	7	6V6GT	0Ω	0Ω	50KΩ	50KΩ	470KΩ	330KΩ	.1Ω	330Ω
	8	0D3/VR-150	INF.	0Ω	INF.	50KΩ	50KΩ	INF.	INF.	INF.
	9	5Y3GT	50KΩ	50KΩ	0Ω	110Ω	50KΩ	100Ω	INF.	50KΩ

‡ CONTROL SWITCH AT CWO.
*CONTROL SWITCH AT ANL.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of + 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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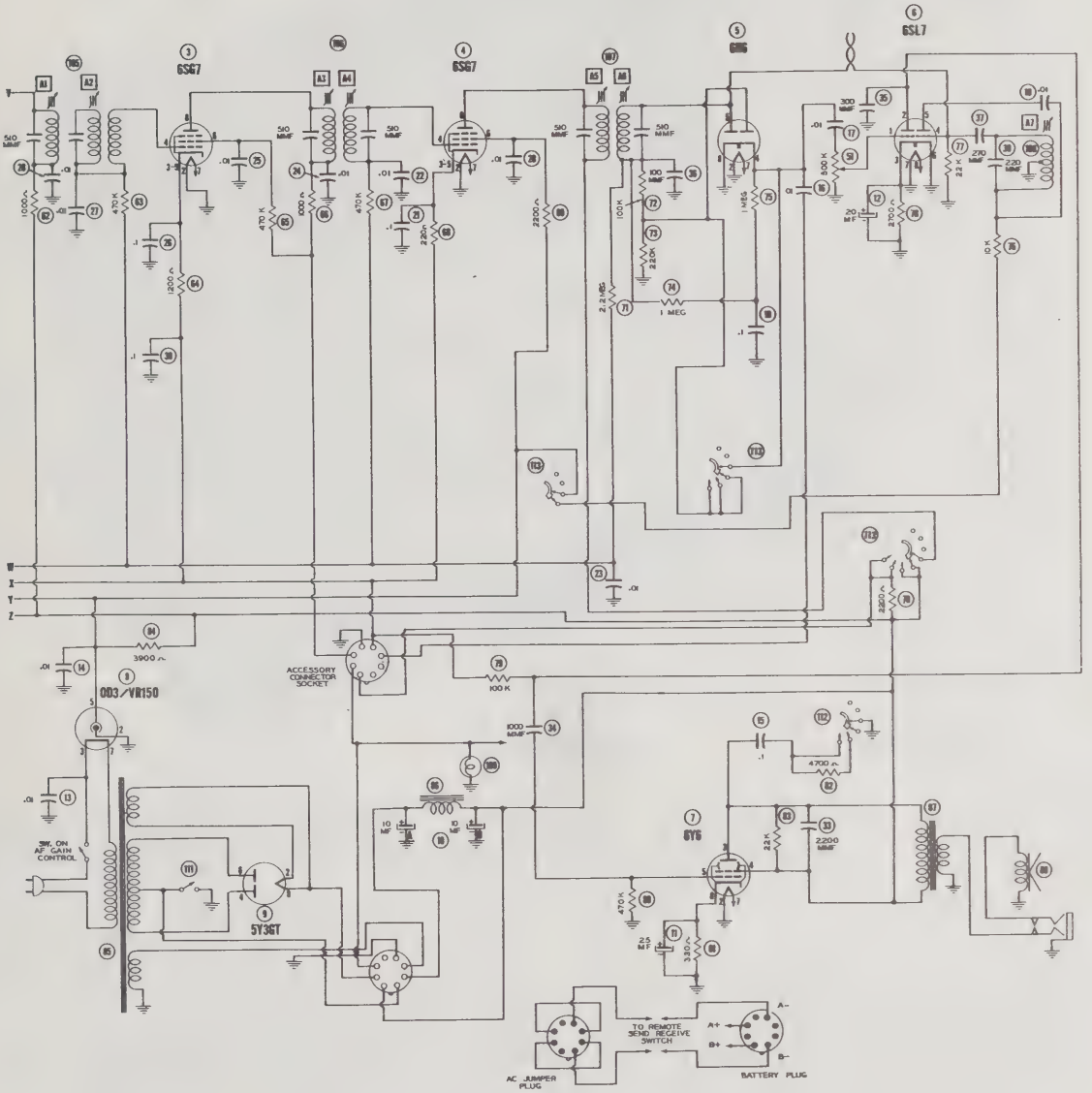

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ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Controls should be set as follow, except where otherwise noted: Bandspread dial to "Set", Control switch to "MVC", RF Gain at maximum, Tone switch to "High", & AF Gain at "Maximum". Attenuate output of sign. gen. to just obtain an output reading. Use an insulated alignment screwdriver for all adjustments.

To set dial turn tuning cap. fully closed and loosen the set screw in coupling on tuning cap. shaft. Turn dial until last line at low frequency end of dial is under the pointer and tighten set screw.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	Direct	High side to center stator of tuning cap. Low side to chassis.	455KC	Band "E"	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4, A5,A6.	Adjust for maximum output.
2	"	"	455KC (Unmodulated)	"	"	"	A7	Control switch to "CWO". Loosen set screw on collar of "Pitch" control shaft, and remove knob and shaft from cabinet. Adjust A7 for zero beat thru hole in cabinet. Replace knob with white dot at midscale. Place collar with set screw directly opposite stop and tighten making certain that position of pitch control does not change from midscale.
3	300Ω carbon res.	High side to left ant. terminal. Low side to center ant. terminal with link disconnected.	54.0MC	Band "A"	54MC	"	A8	Adjust for maximum output Tune sig. gen. to 53.1MC. If signal is not heard retune sig. gen. to 54MC and close A8 to next peak. Adjust for maximum output and recheck for image.
4	"	"	"	"	Tune for maximum output.	"	A9,A10	Rock tuning cap. and adjust for maximum output.
5	"	"	34.0MC	Band "B"	34MC	"	A11	Adjust for maximum output Tune sig. gen. to 33.1MC. If signal is not heard, retune sig. gen. to 34MC and close A11 to next peak. Adjust for maximum output and recheck for image.
6	"	"	"	"	Tune for maximum output.	"	A12, A10	Rock tuning cap. and adjust for maximum output.
7	"	"	12.0MC	"	12MC	"	A13, A14, A15	Adjust for maximum output. Repeat Steps 5, 6 & 7 until no further improvement can be made.
8	"	"	"	Band "C"	"	"	A16	Adjust for maximum output. Tune sig. gen. to 12.9MC. If signal is not heard, retune sig. gen. to 12MC and open A16 to next peak. Adjust for maximum output and recheck for image.
9	"	"	"	"	Tune for maximum output.	"	A17, A10	Rock tuning cap. and adjust for maximum output.
10	"	"	4.4MC	"	4.4MC	"	A18, A19, A20	Adjust for maximum output. Repeat Steps 8, 9 and 10 until no further improvement can be made.
11	"	"	"	Band "D"	"	"	A21	Adjust for maximum output. Tune sig. gen. to 5.3MC. If signal is not heard, retune sig. gen. to 4.4MC and open A21 to next peak. Adjust for maximum output and recheck for image.
12	"	"	"	"	Tune for maximum output.	"	A22, A10	Rock tuning cap. and adjust for maximum output.
13	"	"	1.6MC	"	1.6MC	"	A23	Adjust for maximum output.
14	"	"	"	"	Tune for maximum output.	"	A24, A25	Bandspread dial to "zero". Adjust A24 & A25 for maximum output. Return bandspread dial to "Set". Repeat Steps 11, 12, 13 & 14 until no further improvement can be made.
15	"	"	.6MC	Band "E"	.6MC	"	A26,A27 A28	Bandspread dial to "Zero". Adjust A26, A27 & A28 for maximum output. Return bandspread dial to "Set".
16	"	"	1.5MC	"	1.5MC	"	A29	Adjust for maximum output.
17	"	"	"	"	Tune for maximum output.	"	A30, A10	Rock tuning cap. and adjust for maximum output. Repeat Steps 15, 16 & 17 until no further improvement can be made.

STAGE GAIN MEASUREMENTS

ANTENNA TO RF GRID	2X	600KC
RF GRID TO CONVERTER GRID	5X	600KC
CONVERSION GAIN	14X	IN 600KC OUT 455KC
1st IF TRANSFORMER	.4X	455KC
1st IF TUBE	30X	455KC
2nd IF TRANSFORMER	.5X	455KC
2nd IF TUBE	150X	455KC
3rd IF TRANSFORMER	.7X	455KC
AUDIO	25X	400 ∿
OUTPUT	12X	400 ∿

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by connecting negative (-) 3 volts to the AVC line.

OLYMPIC
MODEL 8-451 BATTERY OPERATED

OLYMPIC
MODEL 8-451 BATTERY OPERATED

OLYMPIC
MODEL 8-451 BATTERY OPERATED

OLYMPIC MODEL 8-451

TRADE NAME	Olympic, Model 8-451
MANUFACTURER	Olympic Radio & Tel. Corp., 3101-19 38th Ave., Long Island City, N. Y.
TYPE SET	Battery Operated Portable Superheterodyne Receiver with Loop Ant.
TUBES (FOUR)	Types 1R5 Converter, 1U4 IF Amp., 1U5 Det.-AVC-AF, 354 Power Output
POWER SUPPLY	1.5 Volt "A" Supply and 67.5 Volts "B" Supply.
RATING	238 MA @ 1.5 volts DC and 9 MA @ 67.5 volts DC
TUNING RANGE—BROADCAST	540-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD	High side to large stator of tuning cap. Low side to chassis.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4	Adjust for maximum output.
2		Loop	1600KC	Tuning cap. fully open.	Across voice coil	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		Loop	1400KC	Tune for maximum output.	Across voice coil	A6	Adjust for maximum output.
4		Loop	600KC	Tune for maximum output.	Across voice coil	A7	Rock tuning cap. and adjust for maximum output. Repeat steps 2, 3, & 4 until no further improvement can be made.

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DATE 10/48-#4818-15 SET #48-FOLDER #15

PARTS LIST AND DESCRIPTIONS

OLYMPIC MODEL P-491

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		OLYMPIC PART No.	STANDARD REPLACEMENT		
1	Converter	1R5	1R5	7AT	
2	IF Amp.	1U4	1U4	6AR	
3	Det.-AVC-AF	1U5	1U5	6BW	
4	Power Output	3S4	3S4	7BA	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	OLYMPIC PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
5	8	150	C01323		BR815	M-8-150		Power Supply Bypass
6	.005	200	C0M2502					Output Plate Bypass
7	.002	400						Audio Coupling
8	.002	200	C0M2202					"
9	.02	200	C0M2203					AF Screen Bypass
10	.02	200	C0M2203					AVC Filter
11	100	300	CCA101M	1468-0001	5W5T1	MO.5-31	1FM-31	AF Plate Bypass-Cer.
12	100	300	CCA101M	1468-0001	5W5T1	MO.5-31	1FM-31	Diode RF Filter-Cer.
13	50	300	CCA500M	1468-00005	5W5Q5	MO.5-45	1FM-45	Oscillator Grid Cap.-Cer.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	OLYMPIC PART No.	IRC PART No.	CLAROSTAT PART No.	
14	1 Meg.	½	RT-1313		15/16-63-Z	Volume Control

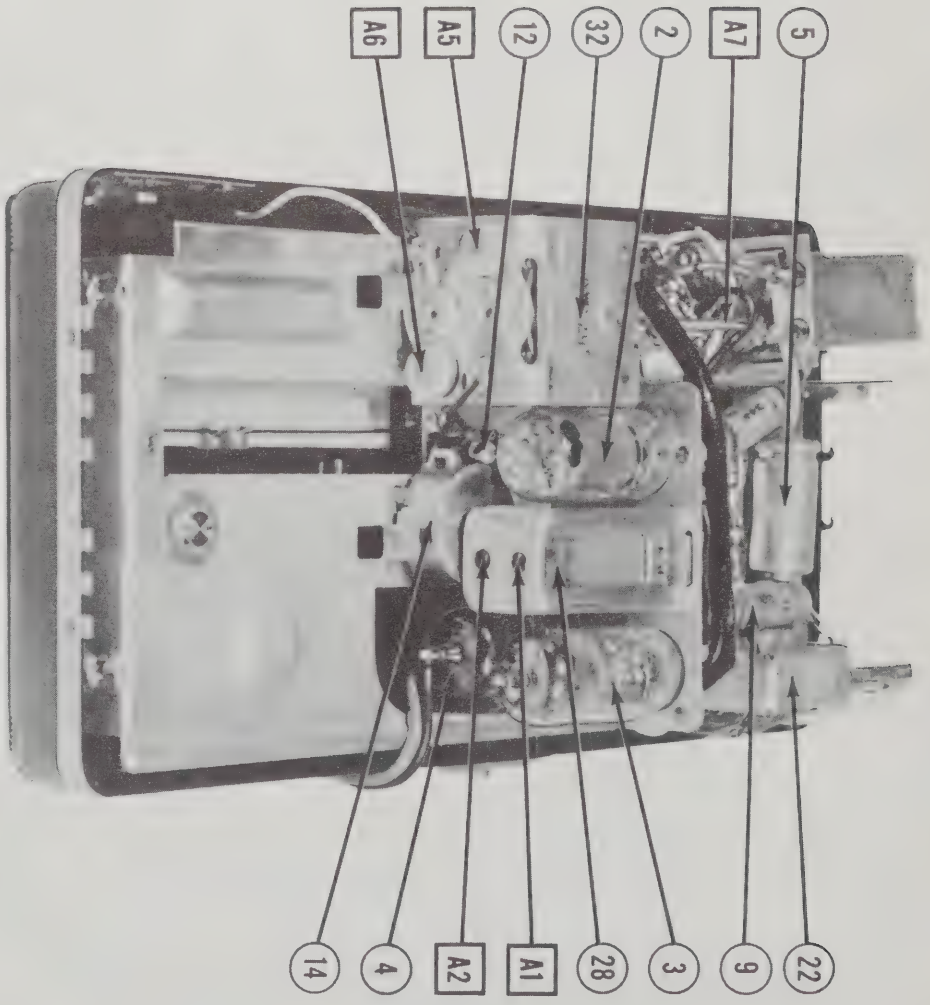
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	OLYMPIC PART No.	IRC PART No.	
15	100K	½	REB 104M	BTS-100K	Br.-Blk.-Yl. Oscillator Grid
16	4.7 Meg.	½	REB 475M	BTS-4.7 Meg.	Yl.-Vl.-Grn. AVC Network
17	10 Meg.	½	REB 106M	BTS-10 Meg.	Br.-Blk.-Blue AF Grid
18	3.3 Meg.	½	REB 335M	BTS-3.3 Meg.	Or.-Or.-Grn. AF Screen
19	1 Meg.	½	REB 105M	BTS-1 Meg.	Br.-Blk.-Grn. AF Plate Load
20	4.7 Meg.	½	REB 475M	BTS-4.7 Meg.	Yl.-Vl.-Grn. Output Grid
21	820	½	REB 821K	BTS-820	Gray-Red-Br. Bias

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		OLYMPIC PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
22	6000Ω	3.7Ω	355Ω	.4Ω	TR-1279		T22S47		

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			OLYMPIC PART No.	JENSEN PART No.	QUAM PART No.	
23	FIELD PM	VC IMP. 3.7Ω	SK-1283		3A07	
24	CONE DIA. 3-3/8"	VC DIA. 9/16"				

R F COILS

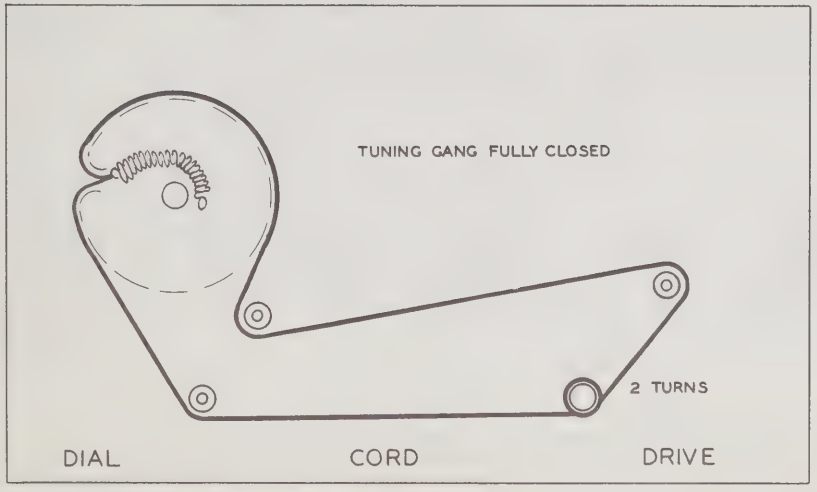
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	OLYMPIC PART No.	MEISSNER PART No.	
25	Ant. Coil		4.4Ω	LP1322		
26	Osc. Coil	1.3Ω	5Ω	CL1315		
27	Input IF	17Ω	17Ω	TR1314		
28	Output IF	17Ω	17Ω	TR1314		

BATTERIES

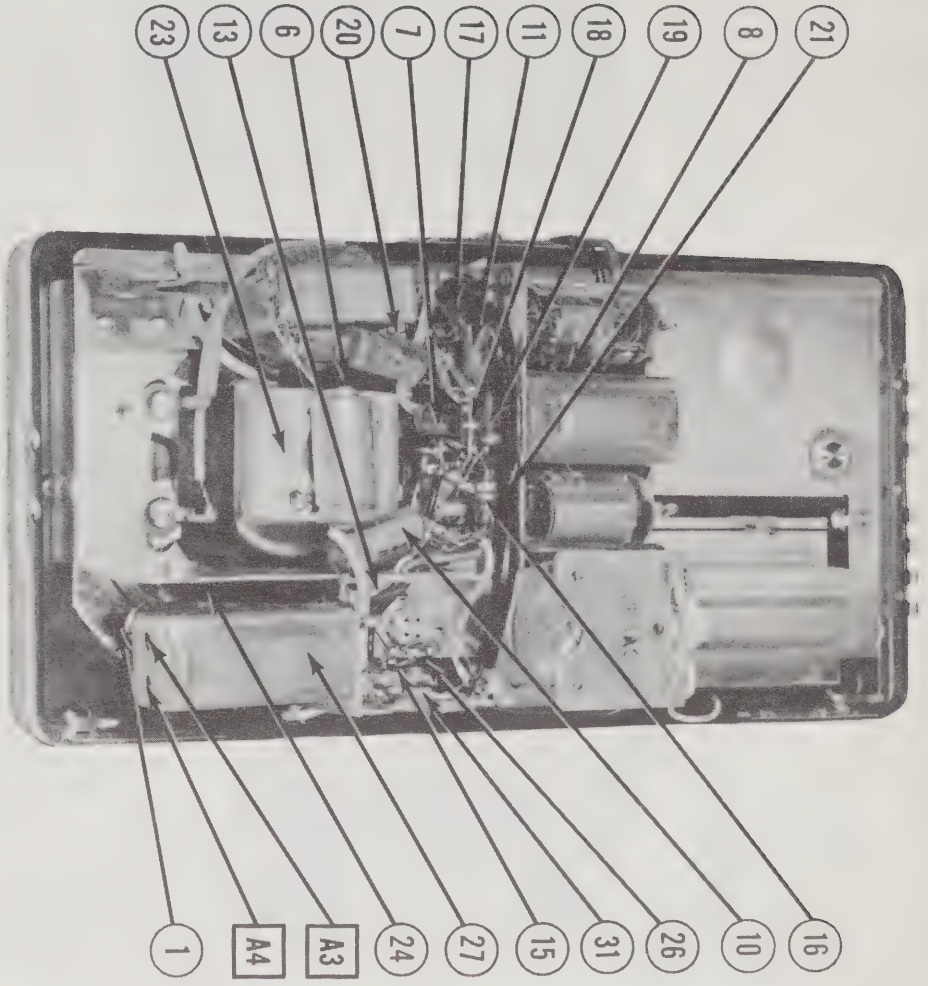
ITEM No.	VOLTAGE	OLYMPIC PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
29	1.5V"A"		950			2R			
30	67.5V"B"			467			XX45		

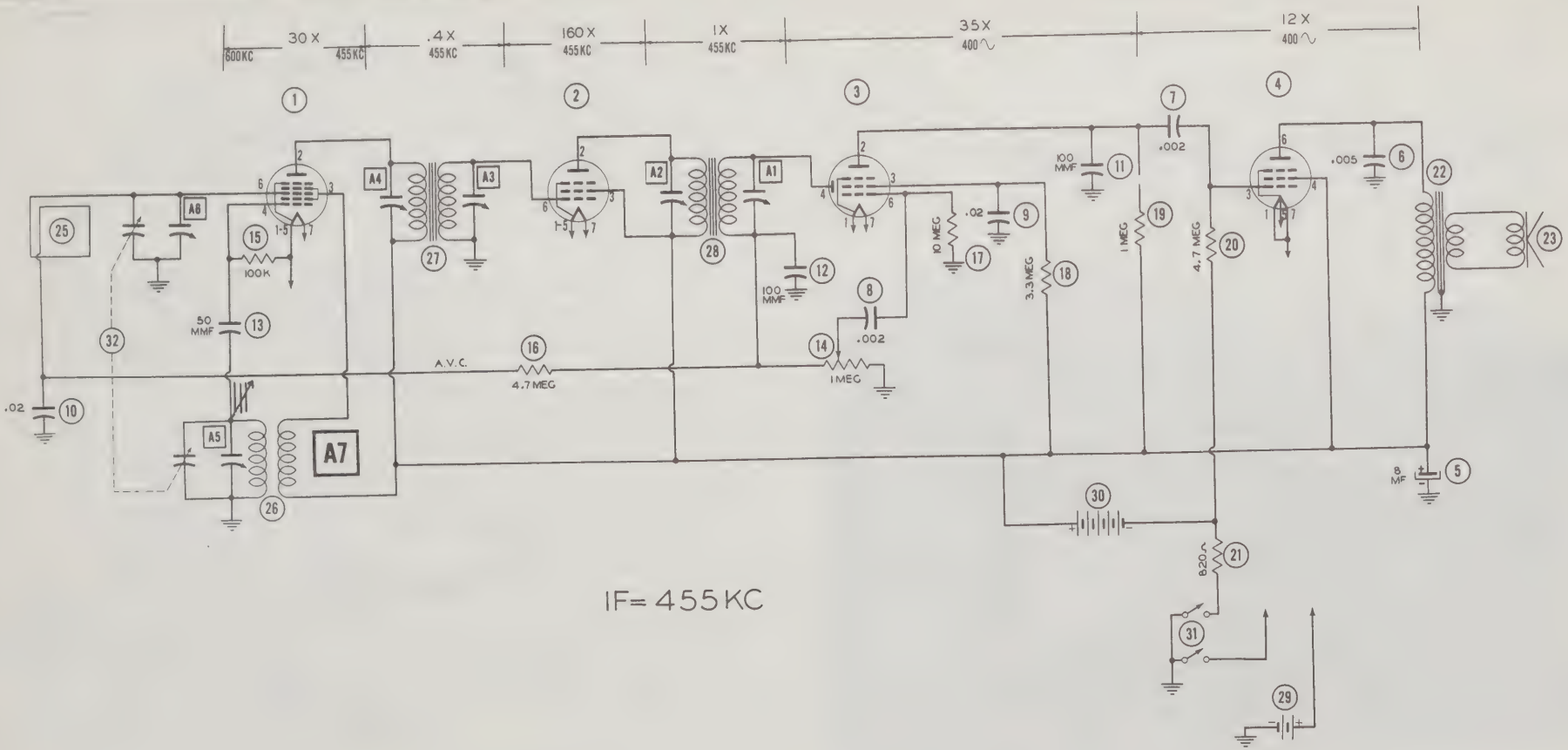
MISCELLANEOUS

ITEM No.	PART NAME	OLYMPIC PART No.	NOTES
31	Switch	SW1280	Power (on-off)
32	2 Gang Var. Cap	CV1291	(14-285MMF, 23-143MMF)
	Dial Pointer	P01310	
	Cabinet	MP1292	
	Knob	KN1309	
	Dial Crystal	CR1307	



CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	0V.	60VDC	60VDC	-6.2VDC§	0V.	0V.	1.4VDC
2	1U4	0V.	60VDC	60VDC	0V.	0V.	0V.	1.4VDC
3	1U5	0V.	8VDC	11VDC	-.1VDC	-7.4VDC	-.1VDC	1.4VDC
4	3S4	0V.	58VDC	-.6VDC	60VDC	0V.	58VDC	1.4VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	0Ω	120KΩ	120KΩ	100KΩ	0Ω	5.7 Meg.	*
2	1U4	0Ω	120KΩ	120KΩ	5.7 Meg.	0Ω	17Ω	*
3	1U5	0Ω	1.1 Meg.	3.4 Meg.	1 Meg.	820Ω	10 Meg.	*
4	3S4	0Ω	120KΩ	4.7 Meg.	120KΩ	0Ω	120KΩ	*

*DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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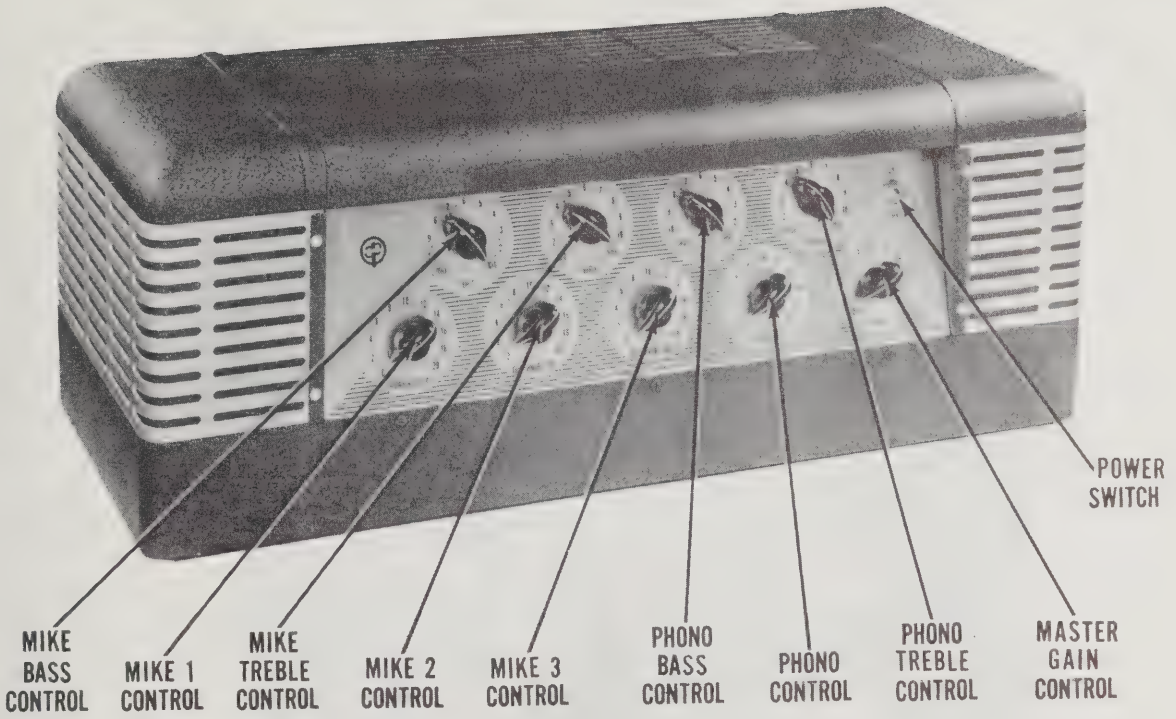
4818-15

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by shorting AVC to chassis.

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
5 - Volume control at maximum, no signal applied for voltage measurements.

OPERADIO
MODEL 1A45



OPERADIO
MODEL 1A45

OPERADIO MODEL 1A45

TRADE NAME	Operadio, Model 1A45
MANUFACTURER	Operadio Mfg. Co., St. Charles, Ill.
TYPE SET	AC Operated 4 Channel Audio Amplifier
TUBES (ELEVEN)	Types, 6J7 Mic. 1 Amp., 6J7 Mic. 2 Amp., 6J7 Mic. 3 Amp., 6J7 AF Amp., 6SN7GT AF Amp.-Phase Inv., (4) 6L6G Power Output, (2) 5U4G Rectifier.
POWER SUPPLY	105-125 Volts AC RATING 2.2 Amp. @ 117 Volts AC

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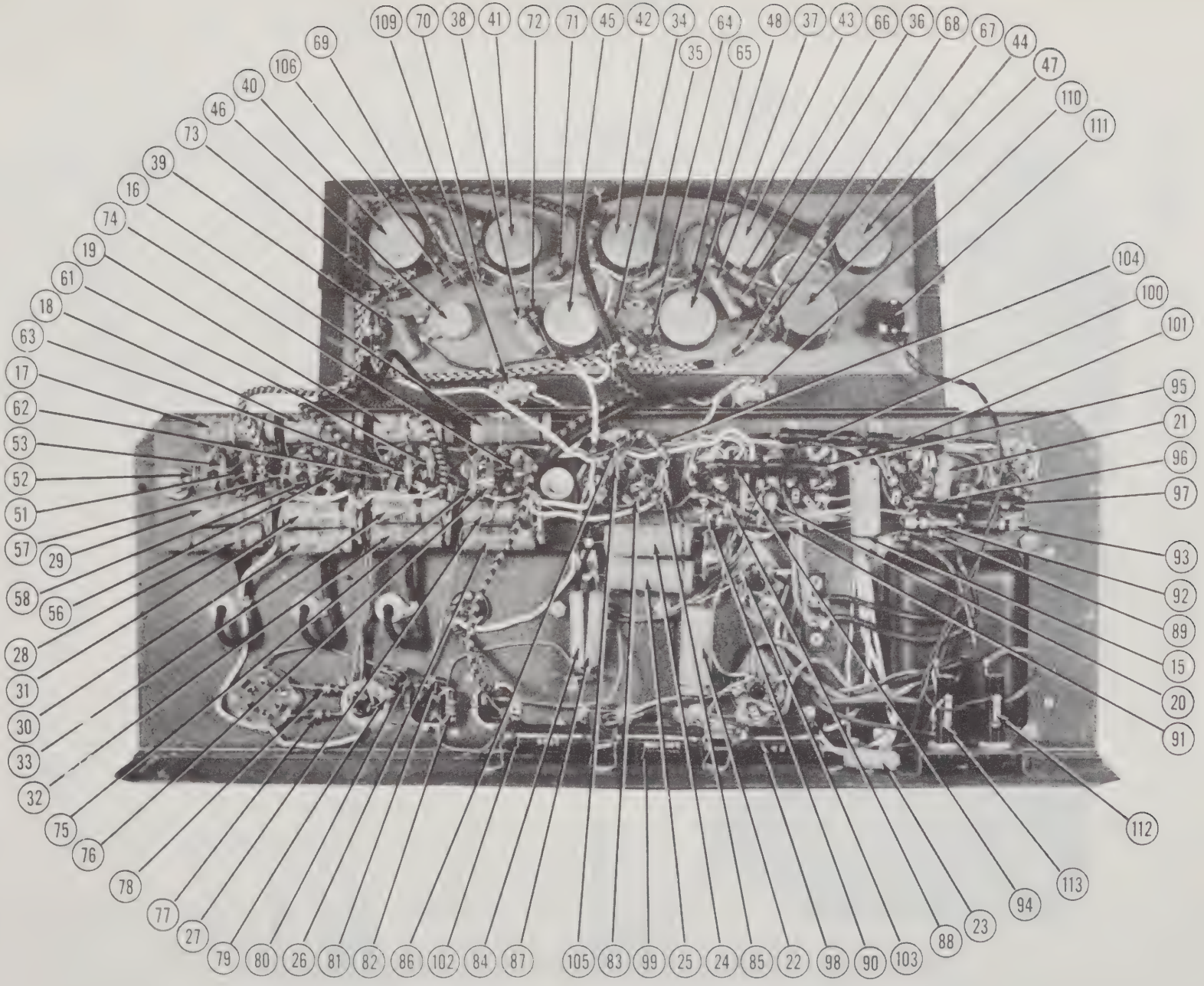
DATE 10/48-#4818-16 SET #48-FOLDER #16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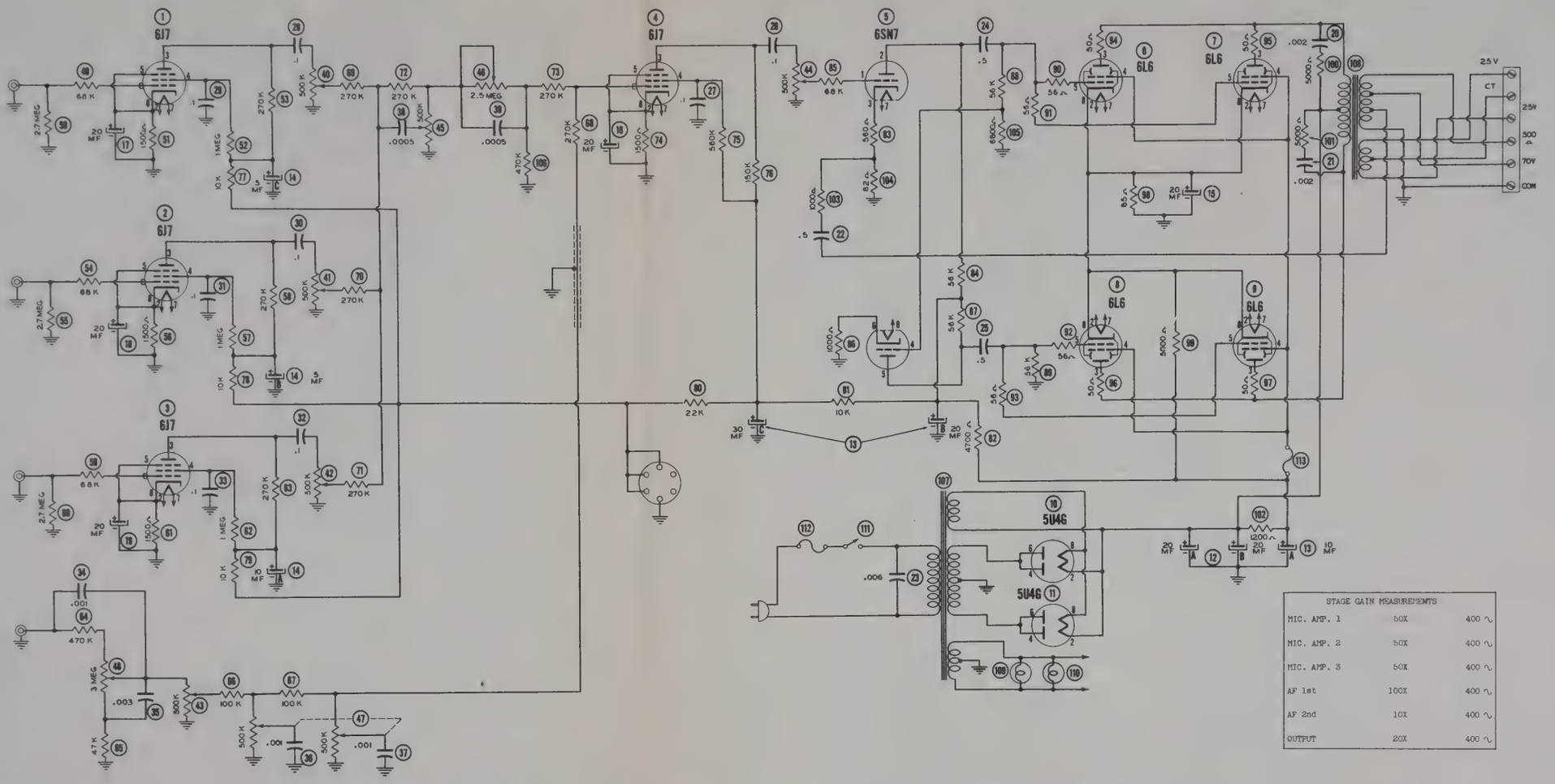

STAGE GAIN MEASUREMENTS

MIC. AMP. 1	50X	400 ∿
MIC. AMP. 2	50X	400 ∿
MIC. AMP. 3	50X	400 ∿
AF 1st	100X	400 ∿
AF 2nd	10X	400 ∿
OUTPUT	20X	400 ∿

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
1	6J7	0V.	3.2VAC	25VDC	35VDC	1VDC	185VDC	3.2VAC	1VDC	0V.
2	6J7	0V.	3.2VAC	25VDC	35VDC	1VDC	185VDC	3.2VAC	1VDC	0V.
3	6J7	0V.	3.2VAC	25VDC	35VDC	1VDC	185VDC	3.2VAC	1VDC	0V.
4	6J7	0V.	3.2VAC	75VDC	60VDC	1VDC	245VDC	3.2VAC	1VDC	0V.
5	6SN7GT	0V.	50VDC	2.5VDC	0V.	100VDC	3.5VDC	3.2VAC	3.2VAC	-
6	6L6G	0V.	3.2VAC	420VDC	330VDC	0V.	0V.	3.2VAC	26VDC	-
7	6L6G	0V.	3.2VAC	420VDC	330VDC	0V.	0V.	3.2VAC	26VDC	-
8	6L6G	0V.	3.2VAC	420VDC	330VDC	0V.	0V.	3.2VAC	26VDC	-
9	6L6G	0V.	3.2VAC	420VDC	330VDC	0V.	0V.	3.2VAC	26VDC	-
10	5U4G	.3VDC	430VDC	0V.	390VAC	0V.	390VAC	.3VDC	430VDC	-
11	5U4G	0V.	430VDC	0V.	390VAC	0V.	390VAC	0V.	430VDC	-

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
1	6J7	0Ω	.05Ω	320KΩ	1 Meg.	1.5KΩ	50KΩ	.05Ω	1.5KΩ	2.7 Meg.
2	6J7	0Ω	.05Ω	320KΩ	1 Meg.	1.5KΩ	50KΩ	.05Ω	1.5KΩ	2.7 Meg.
3	6J7	0Ω	.05Ω	320KΩ	1 Meg.	1.5KΩ	50KΩ	.05Ω	1.5KΩ	2.7 Meg.
4	6J7	0Ω	.05Ω	160KΩ	560KΩ	1.5KΩ	50KΩ	.05Ω	1.5KΩ	2.7 Meg.
5	6SN7GT	69KΩ	66KΩ	640Ω	6.8KΩ	66KΩ	1KΩ	.05Ω	.05Ω	-
6	6L6G	0Ω	.05Ω	6KΩ	6KΩ	65KΩ	6KΩ	.05Ω	85Ω	-
7	6L6G	0Ω	.05Ω	6KΩ	6KΩ	65KΩ	INF.	.05Ω	85Ω	-
8	6L6G	0Ω	.05Ω	6KΩ	6KΩ	56KΩ	INF.	.05Ω	85Ω	-
9	6L6G	0Ω	.05Ω	6KΩ	6KΩ	56KΩ	INF.	.05Ω	85Ω	-
10	5U4G	6KΩ	6KΩ	INF.	21Ω	INF.	21Ω	12Ω	6KΩ	-
11	5U4G	INF.	6KΩ	INF.	19Ω	INF.	19Ω	1Ω	6KΩ	-

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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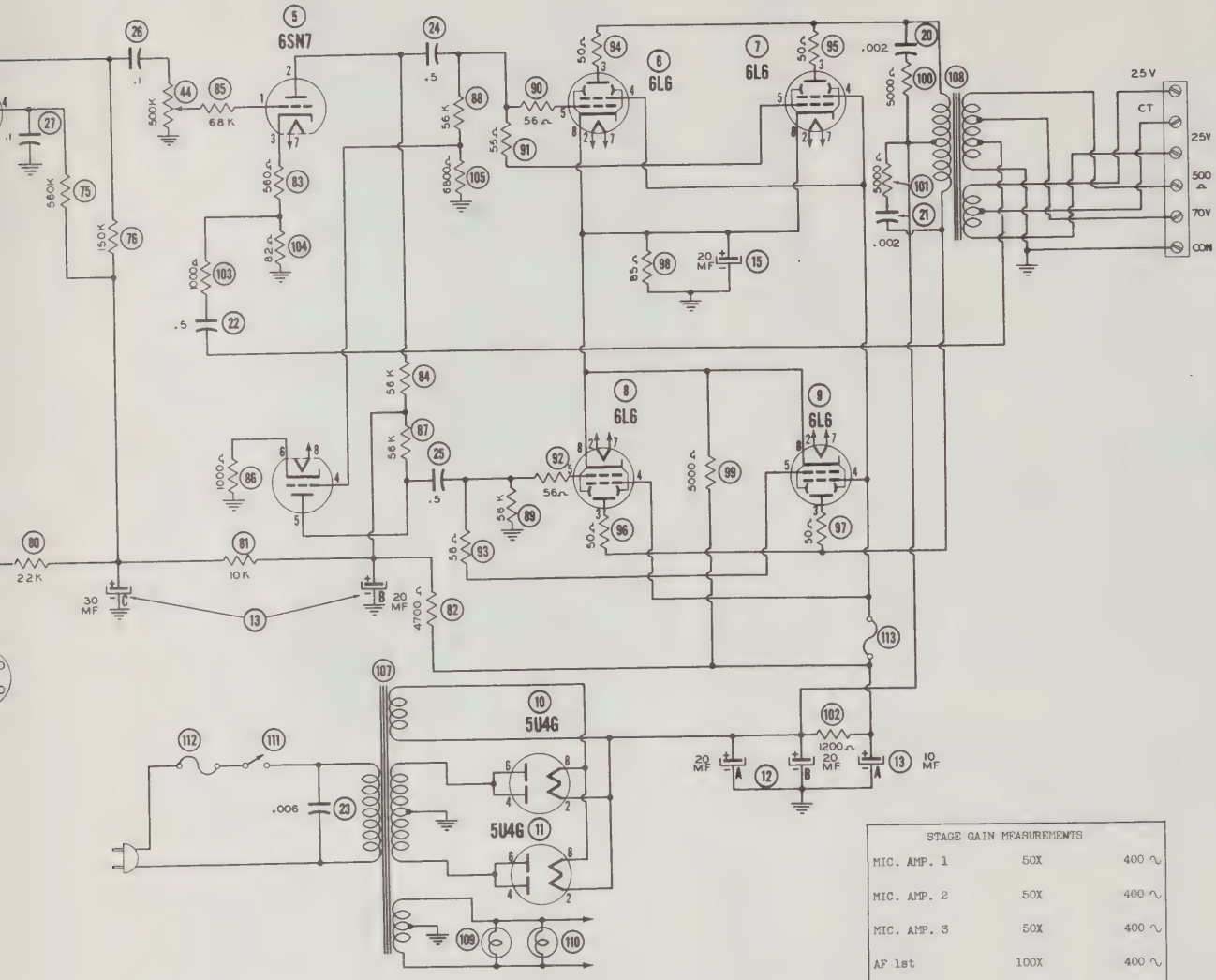
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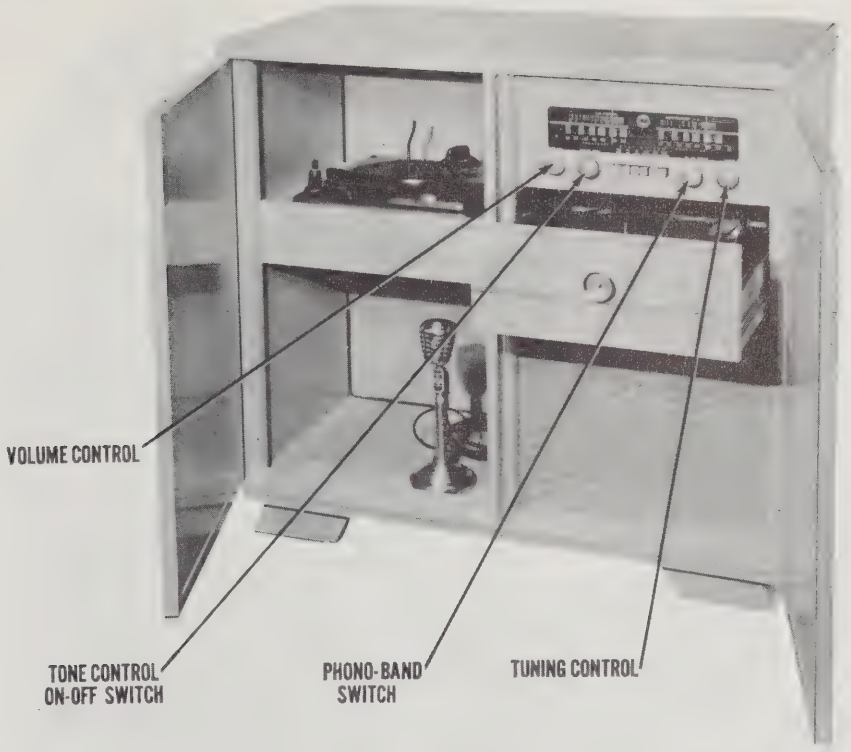
PACKARD-BELL MODEL
1472



PACKARD-BELL MODEL
1472

PACKARD-BELL MODEL 1472

TRADE NAME	Packard-Bell, Model 1472
MANUFACTURER	Packard-Bell Co., 3443 Wilshire Blvd., Los Angeles, Calif.
TYPE SET	AC Operated Combination Phono-Recorder-Radio, AM-FM Superheterodyne Receiver.
TUBES (FOURTEEN)	Types, 6BA6 RF Amp., 6BA6 Mixer, 6C4 Oscillator, 6BA6 1st IF Amp., 6BA6 FM 2nd IF Amp., 6AL5 FM Ratio Det., 6SF7 AM Det.-AVC-AF, 6U5/6G5 Tuning Eye, 6SK7 Mike Pre-Amp., 6H6 Compression Rectifier, 6SN7GT AF-Phase Inv., (2) 6V6GT Power Output, 5U4G Rectifier.
POWER SUPPLY	110-120 Volts AC — RATING 1.15 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1700KC — FREQ. MOD. 88-108MC

RECORDING HEAD PRESSURE:

The proper recording head pressure is 1¼ ounces and is indicated by a small red dot on the indicator located on the cutter arm. In the event this has varied due to shipping vibrations it may be reset with the aid of an ordinary pocket type postage scale. To increase pressure turn indicator wheel clockwise. Turn counter-clockwise to decrease pressure.

HOW TO CHECK COMPRESSION VOLTAGE:

Turn the Selector Switch to BC position and press the pushbutton labeled Record Program. Feed a 2 volt (RMS) 1000 cycle signal into the 2nd detector diode return between the 56K and 220K ohm resistors. Connect a VTVM to the termination of the 4.7 megohm resistor and .1 MFD condenser in the control grid circuit of the 6SF7. This should read between 2.5 to 3.5 volts negative.

HOW TO CHECK RECORDING LEVEL (RECORD PHONO):

Turn the Selector Switch to Phono position, press Record Program pushbutton and feed a 1000 cycle signal of 0.8 volts into the Phono input socket. Substitute a 3 ohm resistor in place of the cutting head. The voltage across the cutter should read between 1.1 and 1.5 volts AC.

HOW TO CHECK RECORDING LEVEL (RADIO RECORD):

Substitute a 3 ohm resistor in place of the cutting head and with the same test setup as outlined in the preceding paragraph the voltage across this resistor should be between 1.1 and 1.5 volts AC.

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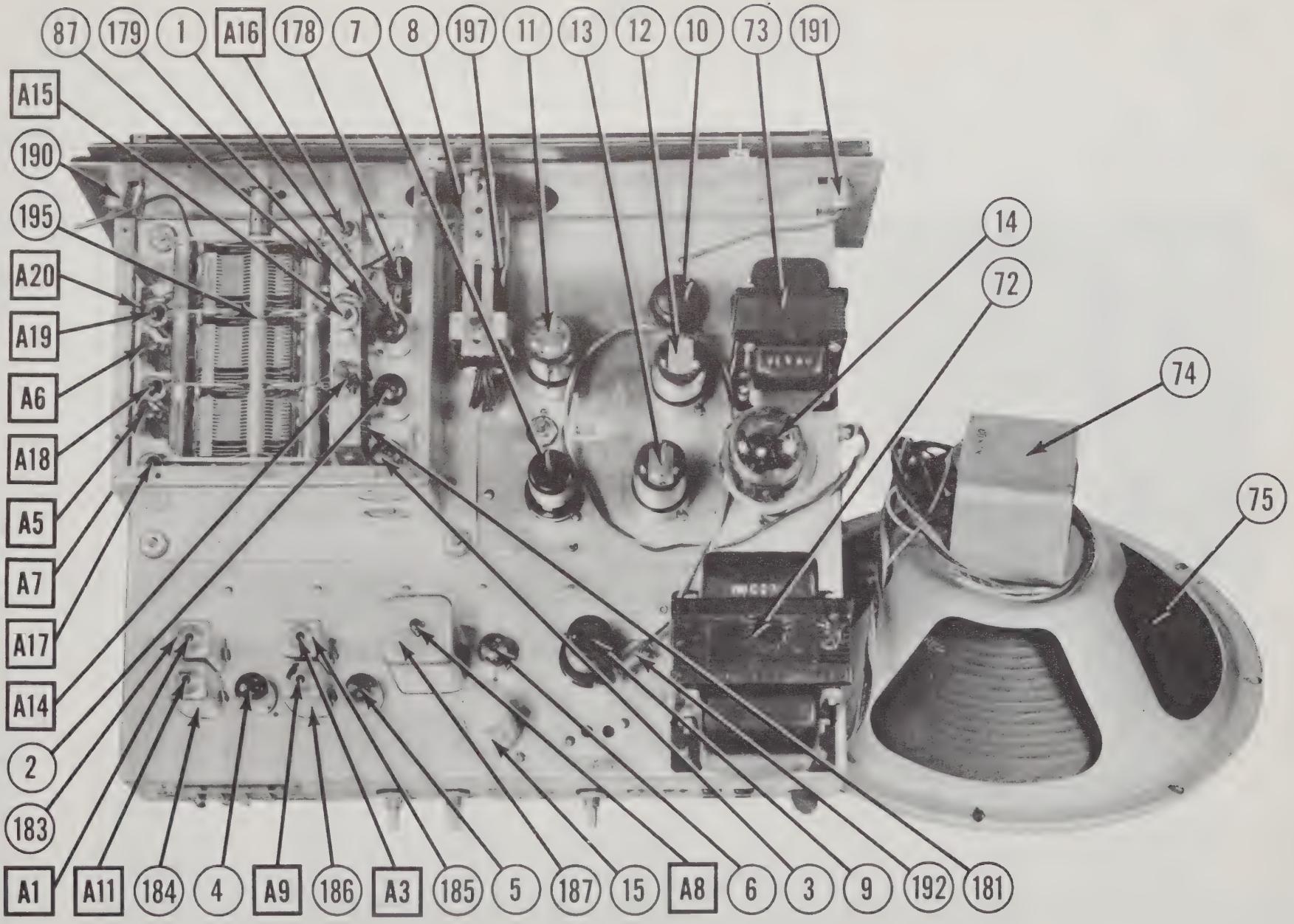
DATE 10/48-#4818-17 SET #48 FOLDER #17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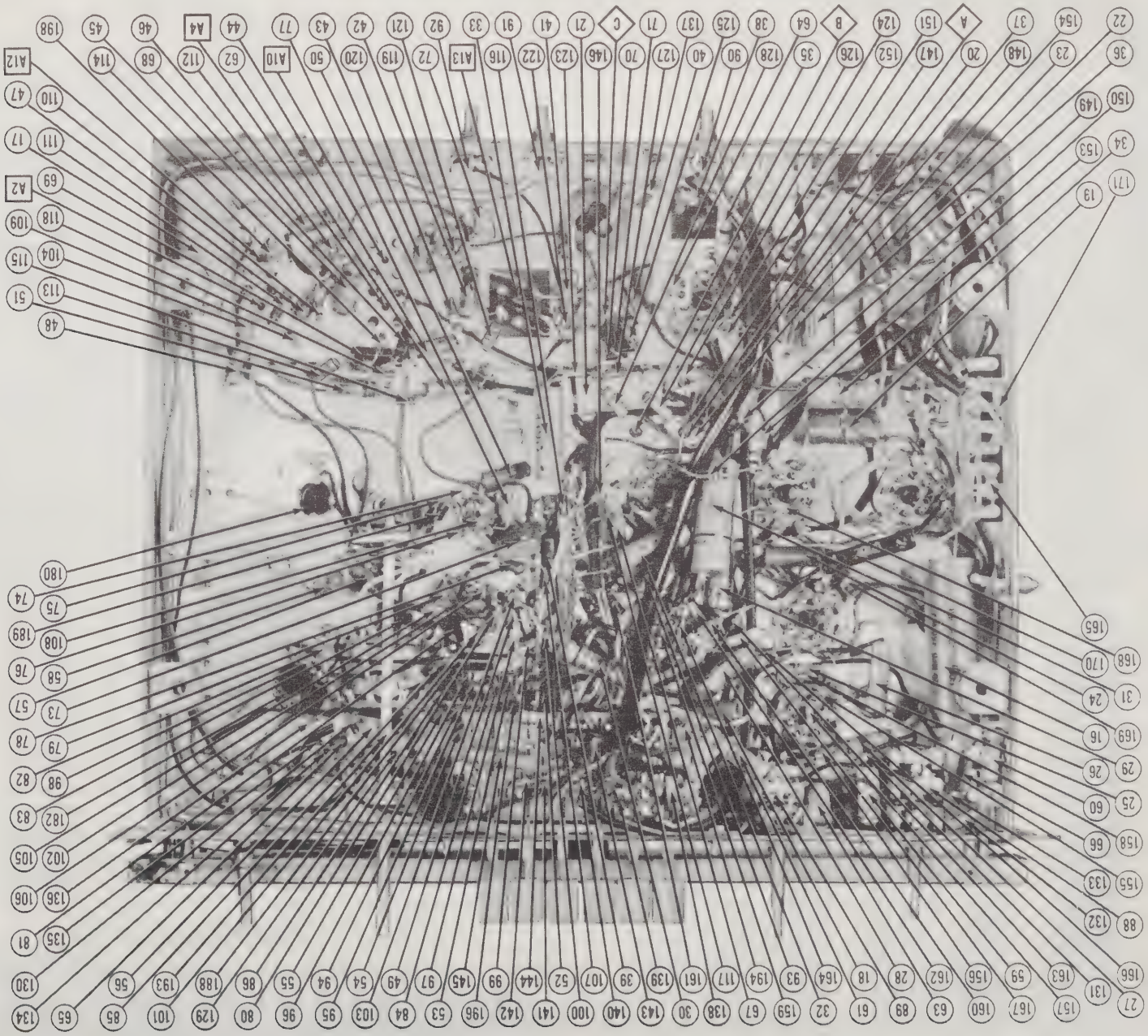


PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: PACKARD-BELL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	6BA6	6BA6	7BK	
2	Mixer	6BA6	6BA6	7BK	
3	Oscillator	6C4	6C4	6BG	
4	1st IF Amp.	6BA6	6BA6	7BK	
5	FM 2nd IF Amp.	6BA6	6BA6	7BK	
6	FM Ratio Det.	6AL5	6AL5	6BT	
7	AM Det.-AVC-AF	6SF7	6SF7	7AZ	
8	Tuning Eye	6U5/6G5	6U5/6G5	6R	
9	Mic.-Pre.-Amp.	6SK7	6SK7	8N	
10	Compression Rect	6H6	6H6	7Q	
11	AF Phase Inv.	6SN7GT	6SN7GT	8BD	
12	Power Output	6V6GT	6V6GT	7AC	
13	Power Output	6V6GT	6V6GT	7AC	
14	Rectifier	5U4G	5U4G	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: PACKARD-BELL PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
15	40	450	24014	AF8J	UP4045	DY-40-450	EL-4	Filter
16	20	450	24001	PRS450/20	BR2045	M-20-450	UT-20	"
17	40	350	24004-2	PRS450/40	BR4045	M-40-350	UT-816#	Decoupling
18	25	25	24006	PRS25/25	BR252A	M-25-25	TA-25	Phase Inv. Cath. Byp.
19	25	25	24006	PRS25/25	BR252A	M-25-25	TA-25	Output Cathode Byp.
20	25	25	24006	PRS25/25	BR252A	M-25-25	TA-25	AF Cathode Bypass
21	5	50	24038	PRS150/4	BR550	M-4-450	TA-55	Stabilizing Cap.
22	.01	125AC	23032	484-01	DT4S1	ST-4-01	TC-11	Line Filter
23	.01	125AC	23032	484-01	DT4S1	ST-4-01	TC-11	" "
24	.002	600	23002	684-002	DT6D2	ST-6-002	TC-22	Output Plate Bypass
25	.002	600	23002	684-002	DT6D2	ST-6-002	TC-22	" " "
26	.005	600	23004	684-005	DT6D5	ST-6-005	TC-25	Audio Coupling
27	.25	200	23021	484-.25	DT2P25	ST-2-25	TC-2	Compression Bias Filter
28	.02	600	23007	684-02	DT6S2	ST-6-02	TC-12	Audio Coupling
29	.02	600	23007	684-02	DT6S2	ST-6-02	TC-12	" "
30	.05	200	23017	484-05	DT2S5	ST-4-05	TC-15	" "
31	.2	400	23020	484-.2	DT4P2	ST-4-2	TC-2	AF Screen Bypass
32	.02	600	23007	684-02	DT6S2	ST-6-02	TC-12	Audio Coupling
33	.1	200	23011	484-.1	DT2P1	ST-2-1	TC-1	Compression Bias Filter
34	.1	400	23011	484-.1	DT4P1	ST-4-1	TC-1	Decoupling
35	.01	600	23023	684-01	DT6S1	ST-6-01	TC-11	Audio Coupling
36	.2	400	23020	484-.2	DT4P2	ST-4-2	TC-2	Decoupling
37	.05	200	23017	484-05	DT2S5	ST-4-05	TC-15	Tone Compensation
38	.001	600	23001	684-001	DT6D1	ST-6-001	TC-21	Audio Coupling
39	.01	500	23023	684-01	DT6S1	ST-6-01	TC-11	AVC Filter
40	.01	500	23027	684-01	DT6S1	ST-6-01	TC-11	" "
41	.003	600	23016	684-003	DT6D3	ST-6-003	TC-23	De-emphasis
42	.01	500	23023	684-01	DT6S1	ST-6-01	TC-11	FM 2nd IF Plate Decoup.
43	.01	500	23023	684-01	DT6S1	ST-6-01	TC-11	FM 2nd IF Screen Byp.
44	.01	500	23023	684-01	DT6S1	ST-6-01	TC-11	RF Bypass Power Supply
45	.01	500	23023	684-01	DT6S1	ST-6-01	TC-11	1st IF Plate Decoup.
46	.01	500	23023	684-01	DT6S1	ST-6-01	TC-11	1st IF Screen Bypass
47	.01	500	23023	684-01	DT6S1	ST-6-01	TC-11	AVC Filter
48	.01	500	23023	684-01	DT6S1	ST-6-01	TC-11	Mixer Plate Decoup.
49	.01	500	23023	684-01	DT6S1	ST-6-01	TC-11	Mixer Screen Byp.
50	.01	500	23023	684-01	DT6S1	ST-6-01	TC-11	Osc. Plate Bypass
51	.01	500	23023	684-01	DT6S1	ST-6-01	TC-11	RF Bypass
52	.01	500	23023	684-01	DT6S1	ST-6-01	TC-11	RF Plate Decoup.
53	.01	500	23023	684-01	DT6S1	ST-6-01	TC-11	RF Screen Bypass
54	.003	600	23016	684-003	DT6D3	ST-6-003	TC-23	Audio Coupling
55	.01	500	23023	684-01	DT6S1	ST-6-01	TC-11	AVC Filter
56	.002	600	23002	684-002	DT6D2	ST-6-002	TC-22	Audio Coupling
57	.01	500	23023	684-01	DT6S1	ST-6-01	TC-11	Osc. Coupling
58	.01	500	23023	684-01	DT6S1	ST-6-01	TC-11	AVC Filter
59	.002	600	23002	684-002	DT6D2	ST-6-002	TC-22	Tone Compensation
60	.01	500	23023	684-01	DT6S1	ST-6-01	TC-11	" "
61	.003	600	23016	684-003	DT6D3	ST-6-003	TC-23	" "
62	.01	500	23023	684-01	DT6S1	ST-6-01	TC-11	AVC Filter
63	.005	600	23004	684-005	DT6D5	ST-6-005	TC-25	Tone Comp.
64	4000	500	23208	1467-004	1D5D4	MW.5-24	1FM-24	Mic. Coupling

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PACKARD-BELL PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
113	1200Ω	½	73025	BTS-1200	Br.-Red-Red 1st IF Plate Decoup.
114	56KΩ	½	73060	BTS-56K	Grn.-Blue-Or. Diode Filter
115	220KΩ	½	73049	BTS-220K	Red-Red-Yl. Diode Load
116	100KΩ	½	73047	BTS-100K	Br.-Blk.-Yl. " "
117	8200Ω	½	73036	BTS-8200	Gray-Red-Red " "
118	2.2 Meg.	½	73055	BTS-2.2 Meg.	Red-Red-Grn. AVC Network
119	68Ω	½	73011		Blue-Gray-Blk. 2nd IF Cathode
120	22KΩ	½	73041	BTS-22K	Red-Red-Or. 2nd IF Screen
121	1200Ω	½	73025	BTS-1200	Br.-Red-Red 2nd IF Plate Decoupling
122	120Ω	½	73014		Br.-Red-Br. RF Filter
123	6800Ω	½	73035	BTS-6800	Blue-Gray-Red Ratio Det. Diode Load
124	6800Ω	½	73035	BTS-6800	Blue-Gray-Red " " " "
125	100KΩ	½	73047	BTS-100K	Br.-Blk.-Yl. AVC Network
126	470KΩ	½	73051	BTS-470K	Yl.-Vi.-Yl. Series FM AVC Test Terminal
127	27KΩ	½	73042	BTS-27K	Red-Vi.-Or. De-emphasis
128	470KΩ	½	73051	BTS-470K	Yl.-Vi.-Yl. Series FM Det. Cent. Test Terminal
129	100KΩ	½	73047	BTS-100K	Br.-Blk.-Yl. FM Output Load
130	33KΩ	½	73043	BTS-33K	Or.-Or.-Or. " " "
131	100KΩ	½	73047	BTS-100K	Br.-Blk.-Yl. Tone Compensation
132	15KΩ	½	73039	BTS-15K	Br.-Grn.-Or. " "
133	56KΩ	½	73060	BTS-56K	Grn.-Blue-Or. " "
134	220KΩ	½	73049	BTS-220K	Red-Red-Yl. " "
135	1.5 Meg.	½	73054	BTS-1.5 Meg.	Br.-Grn.-Grn. " "
136	100KΩ	½	73047	BTS-100K	Br.-Blk.-Yl. " "
137	680KΩ	½	73052	BTS-680K	Blue-Gray-Yl. Playback Crystal Shunt
138	680KΩ	½	73052	BTS-680K	Blue-Gray-Yl. Compression Bias Network
139	1 Meg.	½	73053	BTS-1 Meg.	Br.-Blk.-Grn. Isolation
140	220KΩ	½	73049	BTS-220K	Red-Red-Yl. "
141	220KΩ	½	73049	BTS-220K	Red-Red-Yl. "
142	220KΩ	½	73049	BTS-220K	Red-Red-Yl. "
143	220Ω	½	73017	BW-½-220	Red-Red-Br. 1st AF Cathode
144	560Ω	½	73022	BTS-560	Grn.-Blue-Br. 1st AF Cathode
145	.5Ω	1	73912	BW-½-.47	Output Trans. Sec. Shunt
146	4.7 Meg.	½	73057	BTS-4.7 Meg.	Yl.-Vi.-Grn. 1st AF Grid
147	1.5 Meg.	½	73054	BTS-1.5 Meg.	Br.-Grn.-Grn. 1st AF Screen
148	220KΩ	½	73049	BTS-220K	Red-Red-Yl. 1st AF Plate Load
149	100KΩ	½	73047	BTS-100K	Br.-Blk.-Yl. 1st AF Decoupling
150	56KΩ	1	73076	BTA-56K	Grn.-Blue-Or. Cathode Dropping
151	4.7 Meg.	½	73057	BTS-4.7 Meg.	Yl.-Vi.-Grn. Mic. Pre-Amp. Grid
152	100KΩ	½	73047	BTS-100K	Br.-Blk.-Yl. Mic. Pre-Amp. Plate Load
153	100KΩ	½	73047	BTS-100K	Br.-Blk.-Yl. Mic. Pre-Amp. Plate Decoupling
154	470KΩ	½	73051	BTS-470K	Yl.-Vi.-Yl. Compression Bias Network
155	2.2 Meg.	½	73055	BTS-2.2 Meg.	Red-Red-Grn. Compression Diode Load
156	220KΩ	½	73049	BTS-220K	Red-Red-Yl. Compression Diode Load
157	470KΩ	½	73051	BTS-470K	Yl.-Vi.-Yl. " " "
158	4.7 Meg.	½	73057	BTS-4.7 Meg.	Yl.-Vi.-Grn. Bias Network
159	220KΩ	½	73049	BTS-220K	Red-Red-Yl. 2nd AF Grid
160	220KΩ	½	73049	BTS-220K	Red-Red-Yl. 2nd AF Plate Load
161	2700Ω	½	73030	BTS-2700	Red-Vi.-Red 2nd AF Cathode
162	33KΩ	½	73043	BTS-33K	Or.-Or.-Or. Phase Inv. Grid
163	220KΩ	½	73049	BTS-220K	Red-Red-Yl. Phase Inv. Plate Load
164	2700Ω	½	73030	BTS-2700	Red-Vi.-Red Phase Inv. Cathode
165	15KΩ	½	73039	BTS-15K	Br.-Grn.-Or. Feedback
166	1.5 Meg.	½	73054	BTS-1.5 Meg.	Br.-Grn.-Grn. "
167	470KΩ	½	73051	BTS-470K	Yl.-Vi.-Yl. Output Grid
168	470KΩ	½	73051	BTS-470K	Yl.-Vi.-Yl. " "
169	220Ω	2	73130	BW-2-220	Red-Red-Br. Output Cathode
170	2000Ω	10	73920	AB-2000	Filter
171	15Ω	1	73903	BW-1-15	Cutter Shunt
196	1 Meg.	½	73053	BTS-1 Meg.	Br.-Blk.-Grn. Tuning Eye Grid
197	1 Meg.	½	73053	BTS-1 Meg.	Br.-Blk.-Grn. Tuning Eye Plate Load
198	47KΩ	½		BTS-47K	Yl.-Vi.-Or. 1st IF Transformer Sec. Shunt-See N

Note-Not used in all models.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: PACKARD-BELL PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: THORDARSON PART No.	REPLACEMENT DATA: MERIT PART No.
172	117V AC @ 1.15A	720V CT @.15A DC	5.0V AC @ 3.0A	6.6V AC @ 4.9A	89023	P-4081†‡	T22R33†	P-3155†‡

†Drill new mounting holes.
‡Add series resistor to reduce plate voltage.

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	PACKARD-BELL PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
65	220	300	23215	1468-00025	5W5T25	MO.5-325	1FM-325	Tone Compensation
66	4000	500	23208	1467-004	1D5D4	MW.5-24	1FM-24	" "
67	4000	500	23208	1467-004	1D5D4	MW.5-24	1FM-24	Audio Coupling
68	100	500	23914	1468-0001	5W5T1	MO.5-31	1FM-31	AM Diode RF Filter
69	100	500	23914	1468-0001	5W5T1	MO.5-31	1FM-31	" " " "
70	100	500	23914	1469-0001	5R5T1	MOS.5-31	MS-31	FM Diode Load Cap-Note
71	100	500	23914	1469-0001	5R5T1	MOS.5-31	MS-31	" " " "
72	470	500	23916	1468-0005	5W5T5	MO.5-35	1FM-35	2nd IF Fil. Bypass
73	4000	500	23208	1467-004	1D5D4	MW.5-24	1FM-24	Osc. Plate Bypass
74	10	300	23923	1469-00001	5R5Q1	MOS.5-41	MS-41	Osc. Feedback
75	5	300	23917	1469-000005	5R5V5	MOS.5-55	MS-55	" "
76	47	300	23912-1	1469-00005	5R5Q5	MOS.5-45	MS-45	Osc. Grid Cap.
77	470	500	23916	1468-0005	5W5T5	MO.5-35	1FM-35	Osc. Fil. Bypass
78	10	500	23923	1468-00001	5W5Q1	MO.5-41	1FM-41	Mixer Plate Bypass
79	470	500	23916	1468-0005	5W5T5	MO.5-35	1FM-35	Mixer Fil. Bypass
80	47	300	23912-1	1468-00005	5W5Q5	MO.5-45	1FM-45	Mixer Cathode Bypass
81	100	500	23914	1468-0001	5W5T1	MO.5-31	1FM-31	RF Coupling.
82	47	300	23912-1					Fixed Trimmer
83	100	500	23914	1468-0001	5W5T1	MO.5-31	1FM-31	RF Coupling
84	47	300	23912-1	1468-00005	5W5Q5	MO.5-45	1FM-45	RF Cathode Bypass
85	470	500	23916	1468-0005	5W5T5	MO.5-35	1FM-35	RF Fil. Bypass
86	100	500	23914	1468-0001	5W5T1	MO.5-31	1FM-31	RF Coupling
87	10	300	23923	1469-00001	5R5Q1	MOS.5-41	MS-41	Fixed Trimmer

Note-When either Item #70 or #71 are replaced, replace both with capacitors of equal value.
#-Parallel sections to obtain desired capacity.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	PACKARD-B. PART No.	IRC PART No.	CLAROSTAT PART No.	
88A	1 Meg.	½	25008			Volume Control-Front Section
B	2 Meg.	½				" " -Center Section
C	1 Meg.	½				" " -Rear Section
89A	1 Meg.	½	25508A			Tone Control-Front Section
B	2 Meg.	½				Tone Control and Switch-Rear Section
90A	500KΩ	½	25800	D13-133	M-60-Z	Mike Mixer Control
B	Shaft		Not Req.	A	Not Req.	Attach to 90A per instructions
91A	500KΩ	½	25800	D13-133	M-60-Z	Phono Mixer Control
B	Shaft		Not Req.	A	Not Req.	Attach to 91A per instructions
92A	10KΩ	½	25802	D11-116	M-27-S	P.A. Control
B	Shaft		Not Req.	A	Not Req.	Attach to 92A per instructions
93A	500KΩ	½	25800	D13-133	M-60-Z	Radio Mixer Control
B	Shaft		Not Req.	A	Not Req.	Attach to 93A per instructions

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	PACKARD-BELL PART No.	IRC PART No.	
94	1 Meg.	½	73053	BTS-1 Meg.	Br.-Blk.-Grn. RF Grid
95	270Ω	½	73018-1		Red-Vi.-Br. RF Cathode
96	39Ω	½	73008		Or.-White-Blk. RF Cathode
97	22KΩ	½	73041	BTS-22K	Red-Red-Or. RF Screen
98	3900Ω	½	73032	BTS-3900	Or.-White-Red RF Broadcast Coil Shunt
99	470Ω	½	73021	BTS-470	Yl.-Vi.-Br. RF Plate Load
100	1000Ω	½	73025	BTS-1000	Br.-Blk.-Red RF Plate Decoupling
101	100KΩ	½	73047	BTS-100K	Br.-Blk.-Yl. AVC Network
102	1 Meg.	½	73053	BTS-1 Meg.	Br.-Blk.-Grn. Mixer Grid
103	39KΩ	½	73044-1	BTS-39K	Or.-White-Or. Mixer Screen
104	1200Ω	½	73025	BTS-1200	Br.-Red-Red Mixer Plate Decoup.
105	120Ω	½	73014		Br.-Red-Br. Mixer Cathode
106	1000Ω	½	73025	BTS-1000	Br.-Blk.-Red Mixer Cathode
107	100KΩ	½	73047	BTS-100K	Br.-Blk.-Yl. AVC Network
108	22KΩ	½	73041	BTS-22K	Red-Red-Or. Osc. Grid
109	100KΩ	½	73047	BTS-100K	Br.-Blk.-Yl. AVC Network
110	62Ω	½	73010-1		Blue-Red-Blk. 1st IF Cathode
111	10KΩ	1	73073	BTS-10K	Br.-Blk.-Or. 1st IF Screen Dropping
112	27KΩ	½	73042	BTS-27K	Red-Vi.-Or. 1st IF Screen Bleeder

DATE 10/48-#4918-17 SET #48 FOLDER #17

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		PACKARD-BELL PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
173	10KΩ CT	4.0Ω	320Ω CT	.2Ω	89416A	A-3890†	T22S64	A-3027†	†Drill new mounting holes.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			PACKARD-BELL PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD RES.	VC IMP.				
174	500Ω	4Ω	83803A		12E60*	*Replace output transformer to match 6-8Ω voice coil.
	CONE DIA.	VC DIA.				
175	11½"	1"				

R F COILS

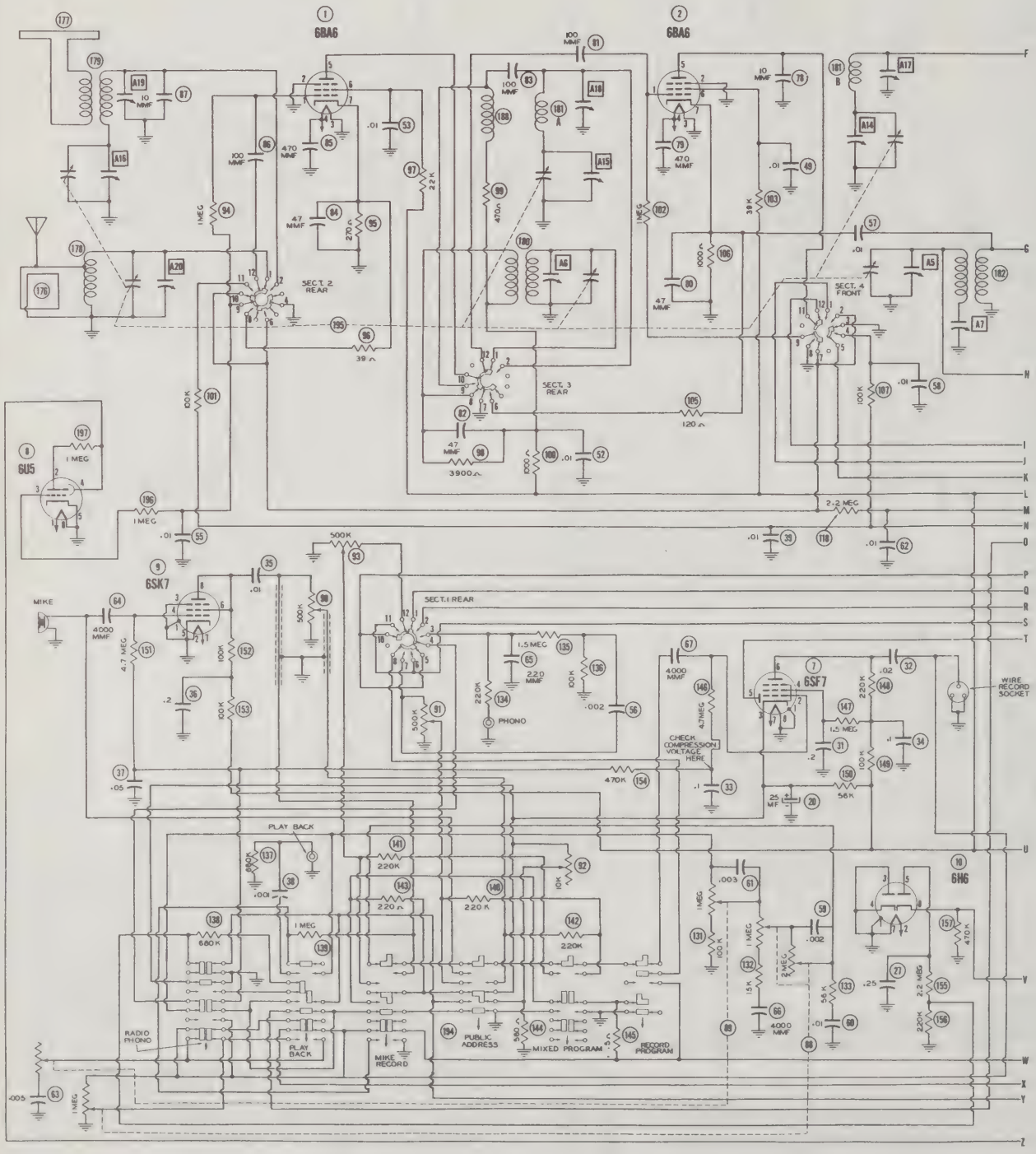
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	PACKARD-BELL PART No.	MEISSNER PART No.	
176	Loop Ant.		0Ω			
177	FM Di-Pole		0Ω			
178	BC Ant.Coil		7.2Ω	29400B		
179	FM Ant.Coil	0Ω	0Ω	29406		
180	BC RF Coil	76Ω	4.6Ω	29102F	14-1057	
181A	FM RF Coil		0Ω	29106		Items 181A and B are wound on same form.
B	FM Osc.Coil		0Ω			
182	BC Osc.Coil	.8Ω	6.1Ω	29205C	14-1060	
183	AM 1st IF	7.8Ω	7.3Ω	29021	16-6678	
184	FM 1st IF	.7Ω	.4Ω	29020		
185	AM 2nd IF	7.9Ω	7.4Ω	29023	16-6678	
186	FM 2nd IF	.8Ω	.4Ω	29022A		
187	FM Det.Trans.	1Ω	.1Ω	29018		
188	Plate Choke		.1Ω	29104		
189	Cathode Chk.		.1Ω	29104		

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					PACKARD-BELL PART No.		
190-192	Bayonet	6-8	0.25	Blue	54001		Type #44

MISCELLANEOUS

ITEM No.	PART NAME	PACKARD-BELL PART No.	NOTES
193	Switch	86016B	Band-Phono
194	"	86301A	Function
195	3 Gang Var. Cap.	23515A	(75-545MMF) each section
A5	Trimmer	23408	BC Osc. Adj.
A6	"	23406	BC RF Adj.
A7	Padder	23402	BC Osc. Adj.
A14	"	23408	FM Osc. Adj.
A15	"	23408	FM RF Adj.
A16	"	23408	FM Ant. Adj.
A17	Trimmer	23408	FM Osc. Adj.
A18	"	23408	FM RF Adj.
A19	"	23408	FM Ant. Adj.
A20	"	23406	BC Ant. Adj.
	Cabinet	21059	
	Dial	38077	Stationized
	"	38078	Eastern



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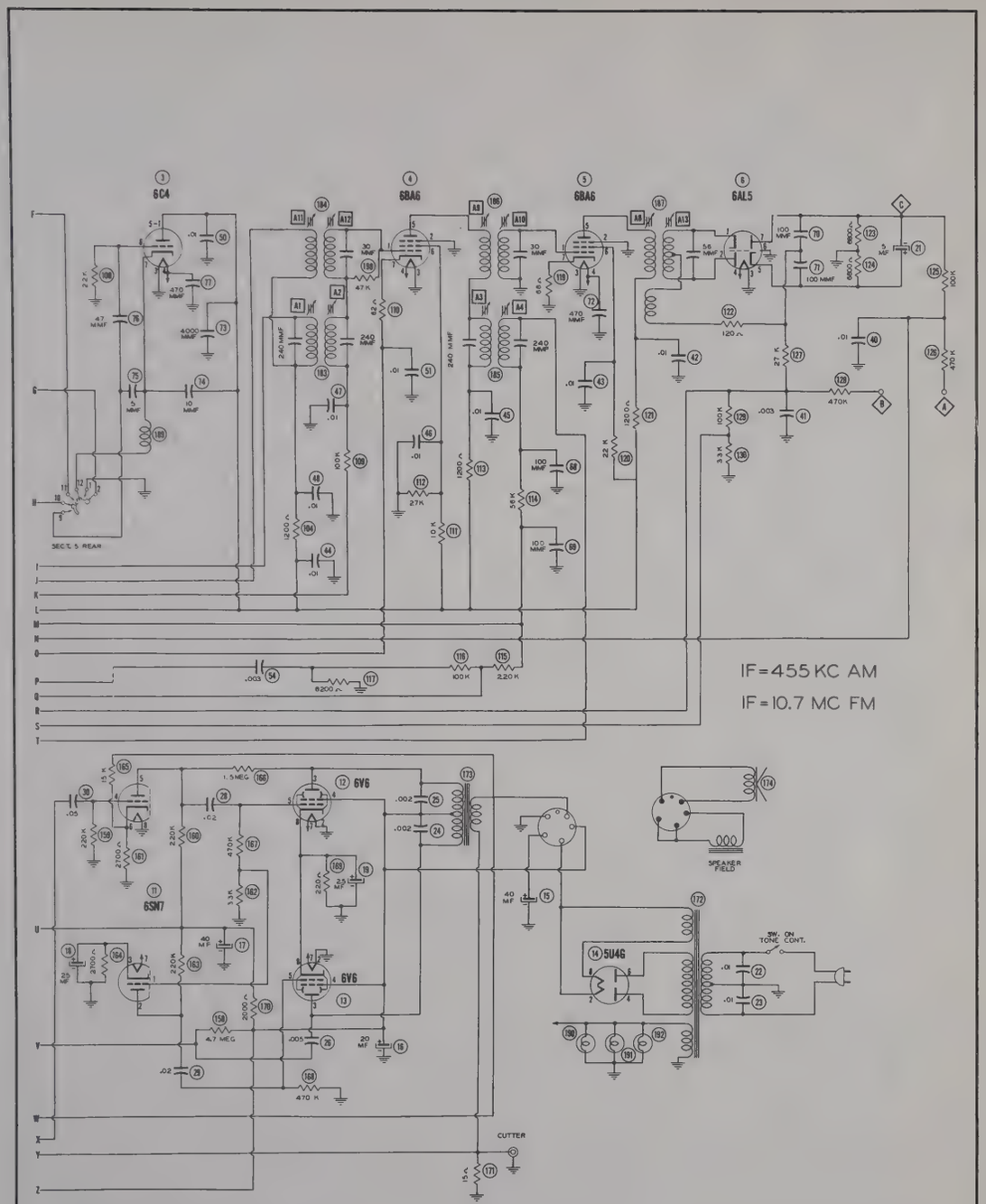

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4818-17

VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6BA6	-.2VDC	0V.	0V.	6.6VAC	170VDC	115VDC	2.4VDC	-
2	6BA6	-.2VDC	0V.	0V.	6.6VAC	170VDC	105VDC	5VDC	-
3	6C4	175VDC	0V.	0V.	6.6VAC	175VDC	-7.8VDC§	0V.	-
4	6BA6	-.2VDC	0V.	0V.	6.6VAC	160VDC	95VDC	.8VDC	-
5	6BA6	0V.	0V.	0V.	6.6VAC	150VDC	80VDC	1VDC	-
6	6AL5	0V.	0V.	0V.	6.6VAC	.2VDC	0V.	-.2VDC	-
7	6SF7	0V.	-.4VDC	0V.	9VDC	-.4VDC	40VDC	6.6VAC	0V.
8	6U5/6G5	-	-	-	-	-	-	-	-
9	6SK7	0V.	0V.	0V.	-.4VDC	0V.	14VDC	6.6VAC	14VDC
10	6H6	0V.	6.6VAC	0V.	6.8VDC	0V.	0V.	0V.	0V.
11	6SN7GT	0V.	32VDC	1.4VDC	0V.	45VDC	1.8VDC	6.6VAC	0V.
12	6V6GT	0V.	0V.	290VDC	300VDC	0V.	180VDC	6.6VAC	18VDC
13	6V6GT	0V.	0V.	290VDC	300VDC	0V.	180VDC	6.6VAC	18VDC
14	5U4G	0V.	380VDC	0V.	360VAC	380VDC	360VAC	300VDC	380VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

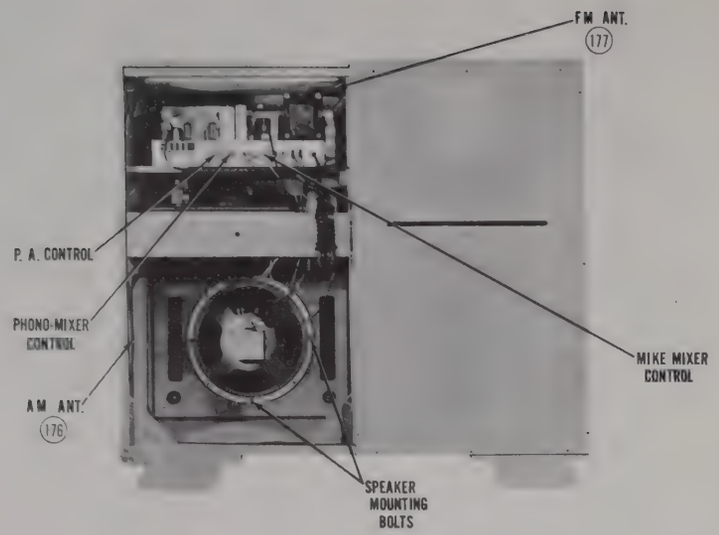
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6BA6	3.2 Meg.	0Ω	0Ω	.1Ω	22KΩ	44KΩ	270Ω	-
2	6BA6	3.2 Meg.	0Ω	0Ω	.1Ω	22KΩ	60KΩ	1KΩ	-
3	6C4	20KΩ	INF.	0Ω	.1Ω	22KΩ	22KΩ	1Ω	-
4	6BA6	100KΩ	0Ω	0Ω	.1Ω	20KΩ	20KΩ	60Ω	-
5	6BA6	.8Ω	0Ω	0Ω	.1Ω	20KΩ	44KΩ	68Ω	-
6	6AL5	160KΩ	160KΩ	0Ω	.1Ω	6.8KΩ	0Ω	6.8KΩ	-
7	6SF7	0Ω	2.9 Meg.	7.5KΩ	1.6 Meg.	380KΩ	340KΩ	.1Ω	0Ω
8	6U5/6G5	-	-	-	-	-	-	-	-
9	6SK7	0Ω	0Ω	0Ω	5 Meg.	0Ω	220KΩ	.1Ω	220KΩ
10	6H6	0Ω	.1Ω	2.4 Meg.	470KΩ	0Ω	220KΩ	0Ω	0Ω
11	6SN7GT	33KΩ	240KΩ	2.7KΩ	220KΩ	240KΩ	2.7KΩ	.1Ω	0Ω
12	6V6GT	0Ω	0Ω	20KΩ	20KΩ	500KΩ	20KΩ	.1Ω	220Ω
13	6V6GT	0Ω	0Ω	20KΩ	20KΩ	470KΩ	20KΩ	.1Ω	220Ω
14	5U4G	INF.	20KΩ	INF.	65Ω	20KΩ	60Ω	20KΩ	20KΩ

‡ VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.
RADIO-PHONO SWITCH IN RADIO POSITION.
RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
5 - Volume control at maximum, no signal applied for voltage measurements.

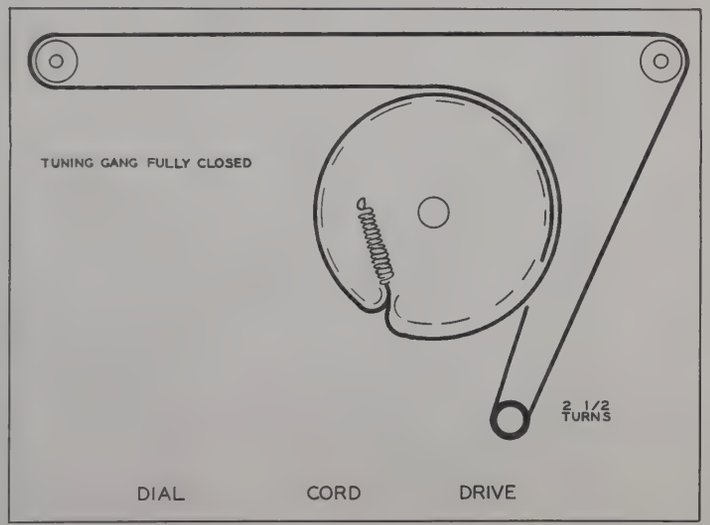
STAGE GAIN MEASUREMENTS		
ANTENNA TO RF GRID	10X	600KC
RF GRID TO MIXER GRID	5X	600KC
CONVERSION GAIN	15X	IN 600KC OUT 455KC
INPUT IF TRANS.	.8X	455KC
IF TUBE	250X	455KC
OUTPUT IF	.1X	455KC
1st AF	35X	400 ∿
2nd AF	4X	400 ∿
OUTPUT	17X	400 ∿
MIC. AMP.	5X	400 ∿

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by connecting negative (-) 3 volts to the AVC line.



DISASSEMBLY INSTRUCTIONS

1. Remove two push-on type control knobs. Loosen set screws and remove the two remaining control knobs.
2. Remove eleven wood screws holding panel over rear of chassis. Remove panel from cabinet.
3. Remove four wood screws holding panel over rear of speaker compartment. Remove panel from cabinet.
4. Remove loop antenna and FM antenna plugs from rear of chassis.
5. Remove phonograph, playback, microphone and cutter plugs from chassis.
6. Remove the two phono-motor plugs from chassis.
7. Remove machine screw holding speaker plug in socket. Remove speaker plug from socket on speaker.
8. Remove phono-compartment light plug from chassis.
9. Remove four machine screws holding chassis in cabinet. Remove chassis from cabinet.
10. Remove four machine screws holding speaker in cabinet. Remove speaker from cabinet.



ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low frequency end of dial.
Use an insulated alignment screwdriver for all adjustments.

AM ALIGNMENT

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	Direct	High side to Pin 1 (grid) of 6BA6 Mixer (2). Low side to chassis.	455KC	AM	Tuning cap. fully closed	Across voice coil	A1,A2, A3,A4	Adjust for maximum output
2	"	High side to Pin 1 (grid) of 6BA6 RF Tube (1). Low side to chassis.	1500KC	"	1500KC	"	A5	" " " "
3	"	"	"	"	Tune for maximum output.	"	A6	" " " "
4	"	"	600KC	"	"	"	A7	Rock tuning cap. and adjust for maximum output. Repeat Steps 2, 3 and 4 until no further improvement can be made.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5	Direct	High side to Pin 1 (grid) of 6BA6 RF Tube (1).Low side to chassis.	10.7MC (Unmodulated)	FM	Tuning cap. fully closed	DC probe to Point ◈. Common to chassis	A8,A9, A10, A11, A12	Adjust for maximum deflection.
6	Direct	"	"	"	"	DC probe to Point ◈. Common to chassis	A13	Use a zero center scale VTVM if available and adjust for zero deflection. Continue with FM-RF Alignment in Step 8.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60 ∿ modulation and 450KC sweep. Use 120 ∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
5	.01 MFD	High side to Pin 1 (grid) of 6BA6 1st IF Tube (4). Low side to chassis.	10.7MC (Freq. Modulated)	FM	Tuning cap. fully closed	Vertical input to Point ◈. Ground to chassis.	A8,A10, A9	Disconnect 5 MFD cap.(21) from Point ◈. Adjust A8, A10 and A9 for maximum amplitude, symmetry and coincidence of pattern per Fig. 1.
6	.01 MFD	High side to Pin 1 (grid) of 6BA6 Mixer (2). Low side to chassis.	"	"	"	"	A12,A11	Adjust for maximum amplitude, symmetry and coincidence of pattern per Fig. 1. Reconnect 5 MFD. cap. (21) to Point ◈.
7	.01 MFD	"	"	"	"	Vertical input to Point ◈. Ground to chassis.	A13	Adjust for maximum straightness of crossover lines with crossover occurring at center of pattern per Fig. 2. Continue with FM-RF Alignment in Step 8.

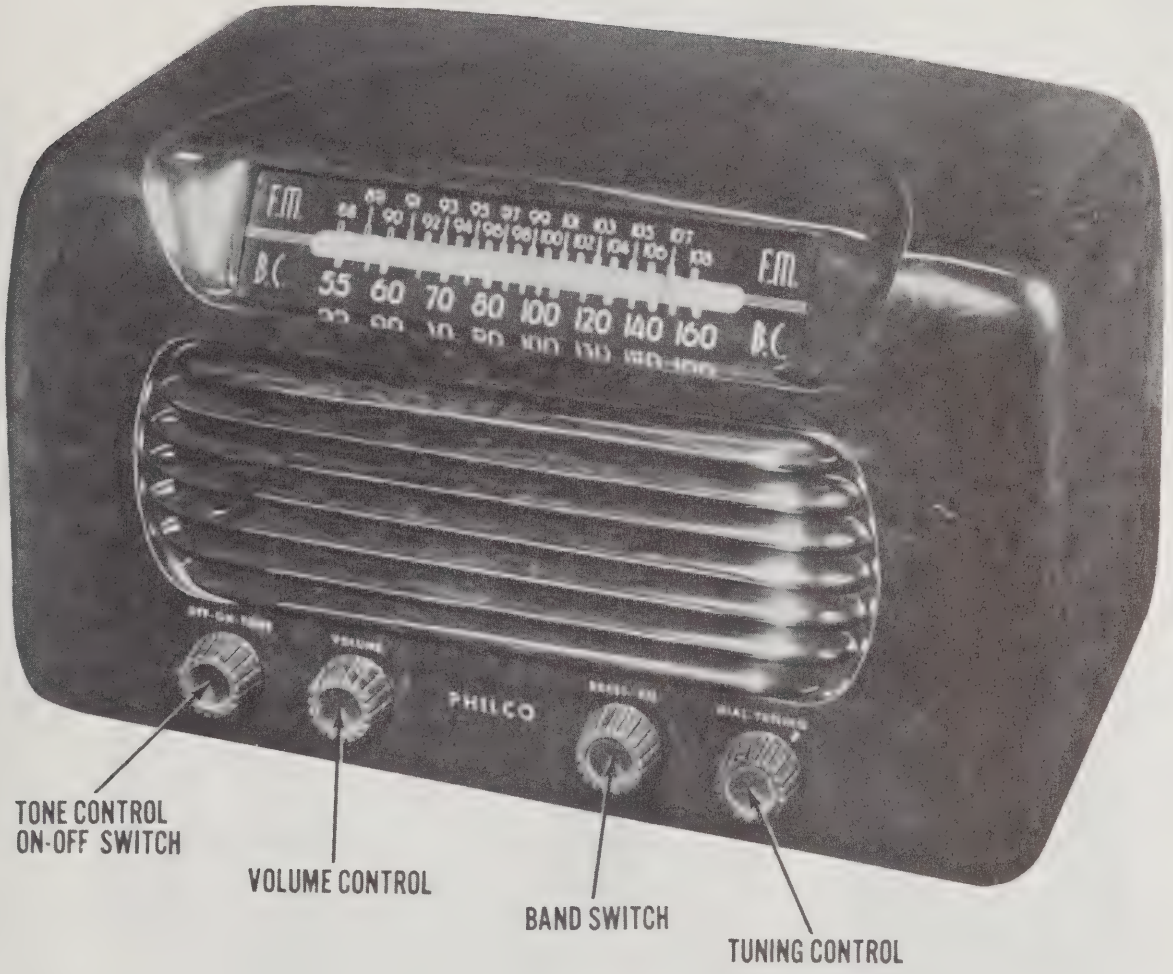
FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
8	270Ω carbon res.	High side to ungrounded FM ant. terminal thru 270. Low side to chassis.	88MC (Unmodulated)	FM	88MC	DC probe to Point ◈. Common to chassis	A14	Adjust for maximum deflection.
9	"	"	"	"	Tune for maximum deflection.	"	A15, A16	Rock tuning cap. and adjust for maximum deflection.
10	"	"	108MC	"	108MC	"	A17	Adjust for maximum deflection.
11	"	"	"	"	Tune for maximum deflection.	"	A18, A19	Rock tuning cap. and adjust for maximum deflection. Repeat Steps 8, 9, 10 and 11 until no further improvement can be made. Reinstall receiver in cabinet.
						OUTPUT METER		
12		Loop	1500KC	BC	Tune for maximum output.	Across voice coil.	A20	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

FIG. 1

FIG. 2

PHILCO MODEL
48-472 REVISED



PHILCO MODEL
48-472 REVISED

PHILCO MODEL 48-472

TRADE NAME	Philco, Model 48-472 (Revised)
MANUFACTURER	Philco Corp., Tioga & "C" Sts., Philadelphia, Pa.
TYPE SET	AC-DC Operated AM-FM Superheterodyne Receiver with Loop Antenna
TUBES (EIGHT)	Types, 12AU6 FM RF Amp., 12AU7 AM Conv., 14F8 FM Conv., 6BJ6 1st IF Amp., 6BJ6 2nd IF Amp., 19T8 Det.-AVC-AF, 50A5 Power Output, 117Z3 Rectifier.
POWER SUPPLY	105-120 Volts AC-DC
RATING	.35 Amp. @ 117 Volts AC
TUNING RANGE - BROADCAST	540-1620KC FREQ. MOD. 88-108MC

HOWARD W. SAMS & CO., INC. **Indianapolis Indiana**

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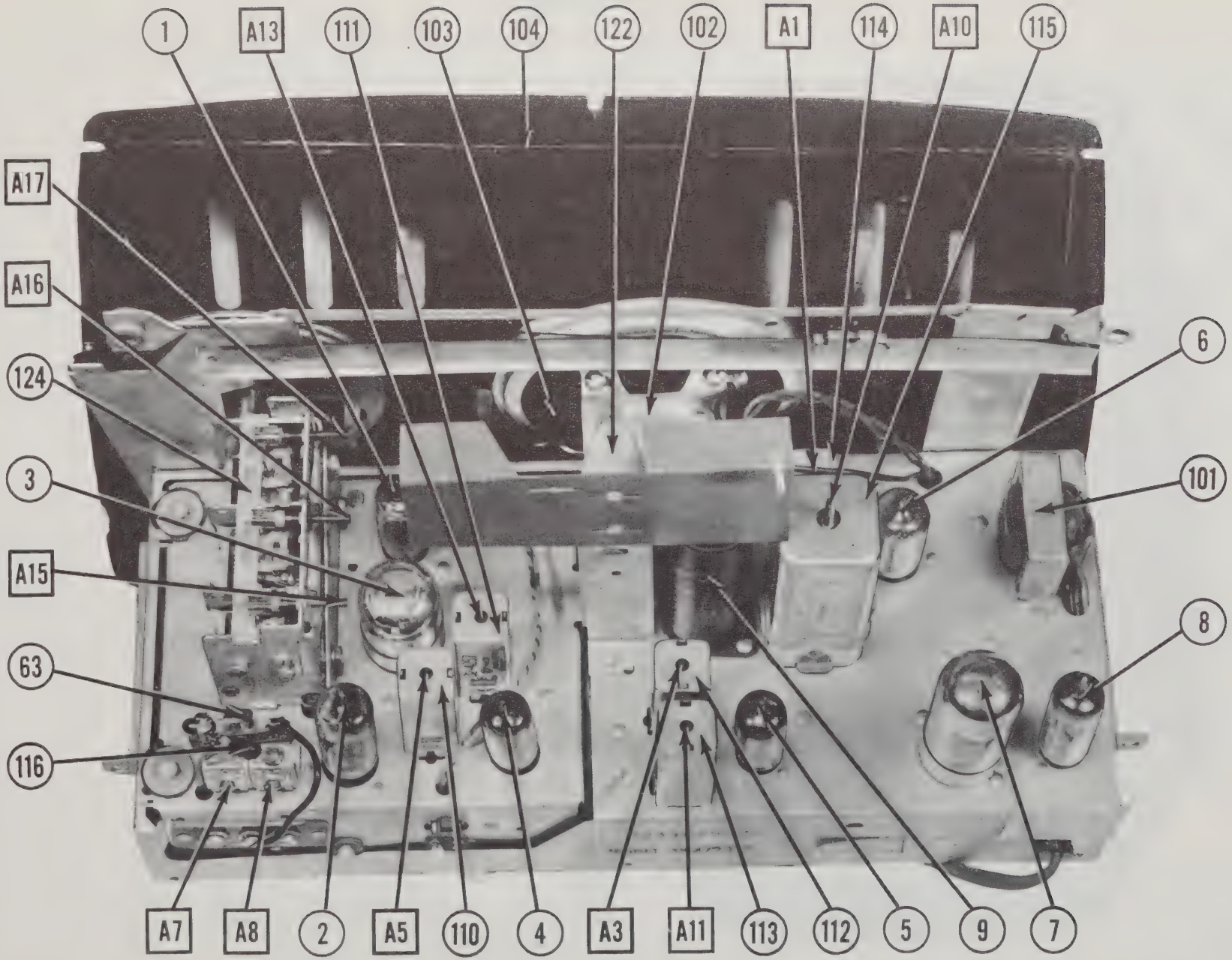
DATE 10/48-#4818-18 SET #48-FOLDER #18


1
A13
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A15
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A7
A8
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A5
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A6
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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	FM RF Amp.	12AU6	12AU6	7BK	
2	AM Conv.	12AU7	12AU7	9A	
3	FM Conv.	14F8	14F8	8BW	
4	1st IF Amp.	6BJ6	6BJ6	7CM	
5	2nd IF Amp.	6BJ6	6BJ6	7CM	
6	Det.-AVC-AF	19T8	19T8		
7	Power Output	50A5	50A5	6AA	
8	Rectifier	117Z3	117Z3	4BR	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
9A	40	150	30-2568-10	AF888D*	UP84215*	DY-804020-150*	EL-340*	■ Filter
B	70	150		PRS150/40	BR2015	M-20-150	UT-401	▲ "
C	40	150						"
10	25	25	45-3001	PRS25/25	BR252A	M-25-25	TA-25	Cathode Bypass
11	2	50	30-2417-7		BR245			Stabilizing Cap.
12	.04	400	45-3500	484-04	DT4S4	ST-6-04	TC-14	Line Filter •
13	.05	400	38-9851-6	484-05	DT4S5	ST-4-05	72P1	Line Isolation-Note
14	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	Rectifier Bypass
15	.02	400	61-0108	484-02	DT4S2	ST-4-02	TC-12	Output Plate Bypass
16	.006	400	45-3500-7	484-006	DT6D6	ST-6-006	TC-26	Audio Coupling
17	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	Tone Comp.
18	.006	400	45-3500-7	484-006	DT6D6	ST-6-006	TC-26	Audio Coupling
19	.02	400	61-0108	484-02	DT4S2	ST-4-02	TC-12	" "
20	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	Diode Load Cap.
21	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	RF Bypass
22	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	" "
23	.05	400	61-0122	484-05	DT4S5	ST-4-05	TC-15	Decoupling
24	.03	400	45-3500-1	484-03	DT4S3	ST-6-03	TC-13	"
25	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	2nd IF Screen Byp.
26	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	2nd IF Plate Decoup.
27	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	2nd IF Cath. Bypass
28	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	1st IF Plate Decoup.
29	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	1st IF Screen Byp.
30	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	AVC Filter
31	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	AM Conv. Plate Decoup.
32	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	FM Conv. Plate Decoup.
33	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	Fil. Bypass
34	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	AVC Filter
35	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	AM Osc. Tun. Cap. Isol.
36	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	Output Grid Filter-Cer.
37	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	AF Plate Byp.-Cer.
38	1500	300	62-215001001	1467-0015	1W5D15	MW.5-215	1FM-215	De-emphasis-Cer.
39	1500	300	62-215001001	1467-0015	1W5D15	MW.5-215	1FM-215	RF Byp. Pwr. Supply-Cer.
40	1500	300	62-215001001	1467-0015	1W5D15	MW.5-215	1FM-215	FM Conv. Plate Decoup."
41	220	300	62-122001001	1469-0002	5R5T2	MOS.5-32	MS-32	Osc. Feedback-Cer.
42	100	300	62-110009001	1468-0001	5R5T1	MOS.5-31	MS-31	Osc. Grid Cap.-Cer.
43	220	300	62-122001001	1469-0002	5R5T2	MOS.5-32	MS-32	Osc. Feedback-Cer.
44	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	FM Conv. Cath. Byp.-Cer.
45	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	FM Conv. Fil. Byp.- "
46	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	FM Conv. Fil. Byp.- "
47	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	FM RF Coupling - "
48	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	" " " - "
49	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	FM RF Screen Byp. - "
50	33	300	30-1224	1468-00004	5W5Q4	MO.5-44	1FM-44	FM RF Cath. Byp.- - "
51	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	Decoup. - "
52	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	FM RF Fil. Byp. - "
53	51	300	30-1224-2	1468-00005	5W5Q5	MO.5-45	1FM-45	FM RF Coupling - "
54	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	FM Ant. Coupling - "
55	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	" " " - "
56	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	RF Bypass - "
57	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	" " - "
58	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	Fil. Bypass - "
59	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	AM Osc. Feedback - "
60	220	300	62-122001001	1469-0002	5R5T2	MOS.5-32	MS-32	AM Osc. Grid Cap. - "

PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: JENSEN PART No.	REPLACEMENT DATA: QUAM PART No.	INSTALLATION NOTES
	FIELD	VC IMP.		ST-1o5†		†Drill and tap magnet frame.
102	PM	3.4Ω	30-1625	Mod. P5-X	5A15†	
	CONE DIA.	VC DIA.				
103	4½"	5/16"				

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: MEISSNER PART No.	
104	Loop Ant.		1.5Ω	32-4052-16		
105	Loading Coil		1Ω	32-4158-1		
106	FM Ant.Coil		0Ω	32-4158-1		
107	FM RF Coil		0Ω	32-4159-1		
108	BC Osc. Coil		11Ω	32-4221-1	14-1060	
109	FM Osc. Coil		0Ω	32-4018-5		
110	AM 1st IF	8.5-20#	19Ω	32-4258		‡Tertiary Winding Resistance
111	FM 1st IF	1Ω	1.2Ω	32-4257		
112	AM 2nd IF	10Ω	10Ω	32-4160-3		
113	FM 2nd IF	1Ω	1Ω	32-4257-1		
114	AM 3rd IF	16Ω	15.8Ω	32-4240-2		
115	FM Det. Trans.	1.5Ω	.1Ω	32-4261		
116	RF Choke		.5Ω	32-4061-2		
117	RF Plate Choke		.5Ω	32-4061-2		
118	RF Choke		.5Ω	32-4061-2		
119	" "		.5Ω	32-4061-2		
120	" "		.5Ω	32-4061-2		
121	Fil. Choke		1.5Ω	32-4143-4		

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA:	INSTALLATION NOTES
122	Screw	115-125			34-2477		Type #C7

MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
123	Switch	42-1834	Band
124	Tuning Gang	31-2724-1	(14-512MMF, 8-240MMF)
A7, A8	Trimmer Strip	31-6476-13	BC Osc. Adj.; BC Ant. Adj.
A15, A16, A17	Trimmer Strip	31-2724-1	FM Osc. Adj.; FM RF Adj.; FM Ant. Adj.
	Cabinet	10666	Less Scale
	Dial Scale	27-5954-2	
	Dial Pointer	28-8953	
	Knob	54-4376	

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
61	1500	300	62-215001001	1467-0015	1W5D15	MW.5-215	1FM-215	AM Conv. Cath. Byp.-Cer.
62	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	RF Coupling
63	10	500	62-010009001	1469-00001	5R5Q1	MOS.5-41	MS-41	Ext. Ant. Coup.
64	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	RF Byp.

*Parallel sections to obtain desired capacity.
Note - Wind same number turns of wire around replacement capacitor as on original.

CONTROLS

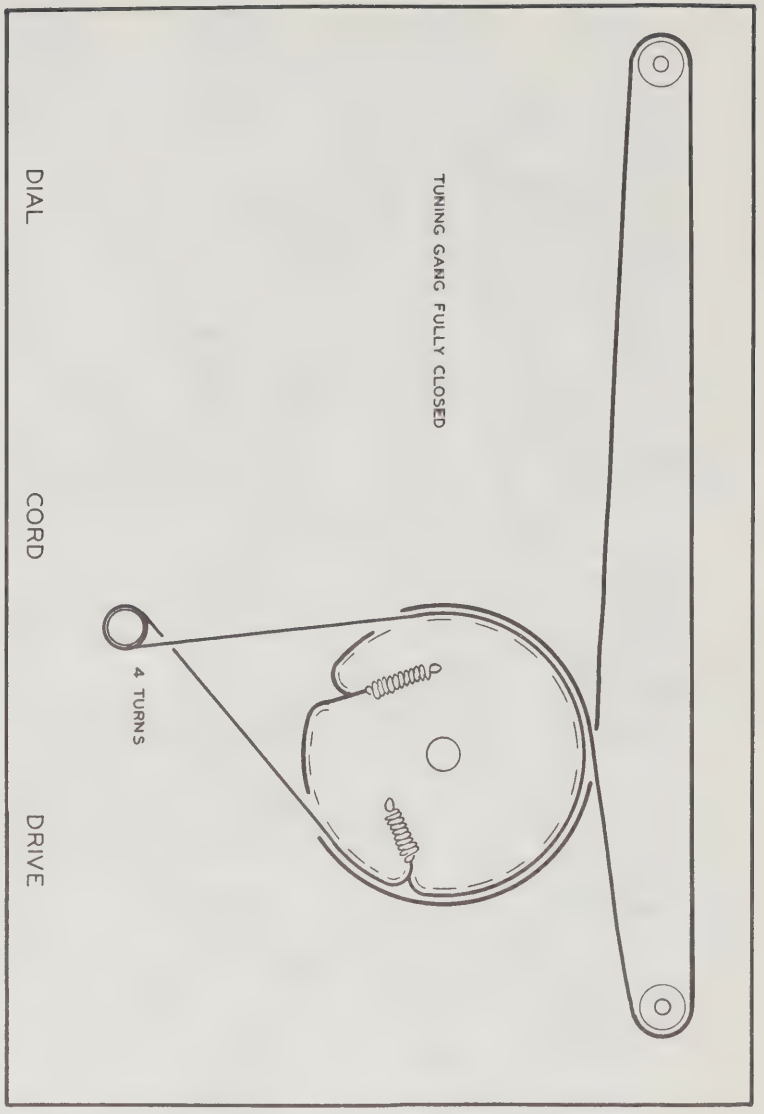
ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	PHILCO PART No.	IRC PART No.	CLAROSTAT PART No.	
65	2 Meg.	½	33-5539-19		M-83-S	Volume Control
66	500KΩ	½	33-5538-11			Tone Control

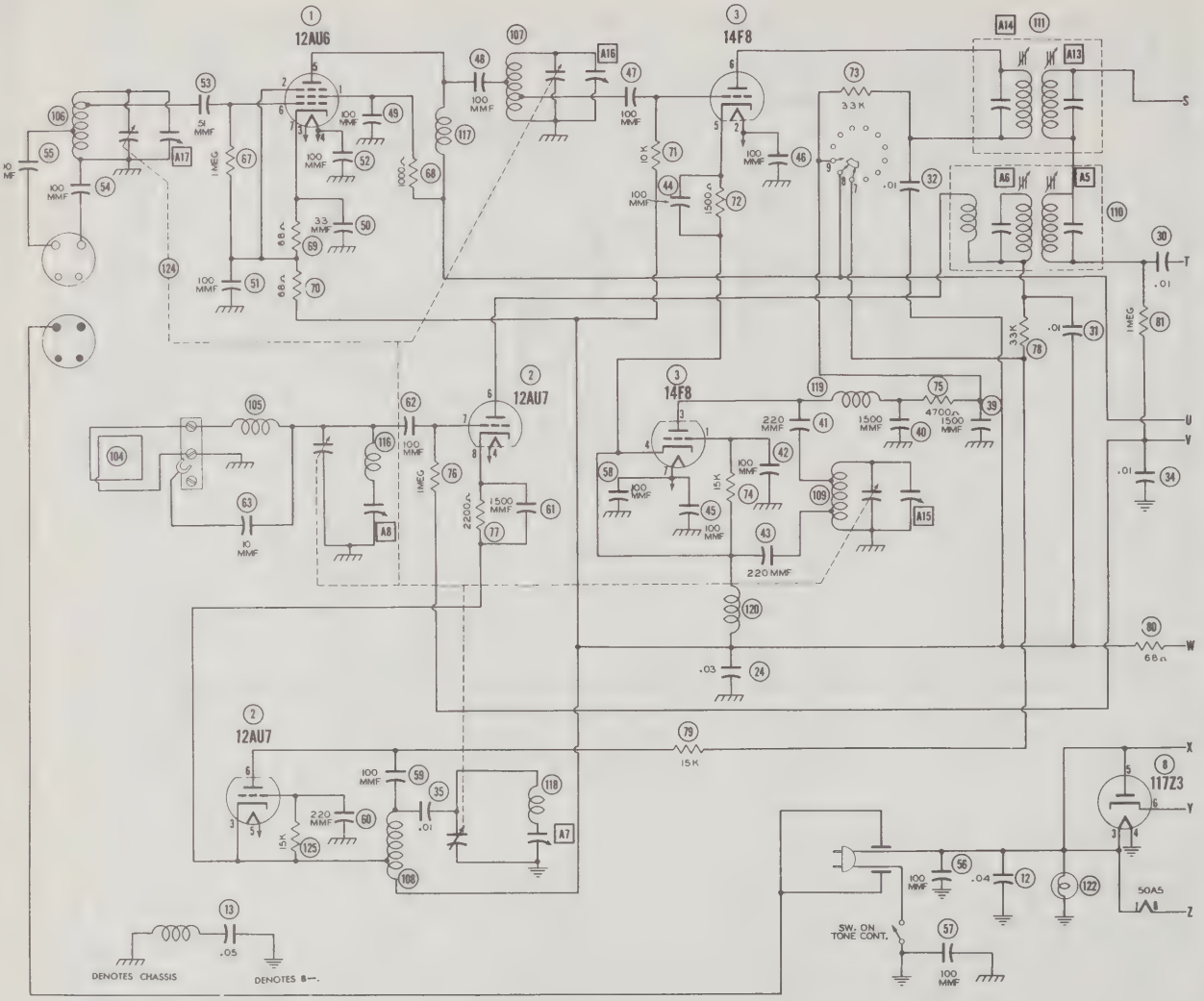
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	PHILCO PART No.	IRC PART No.	
67	1 Meg.	½	66-5103340	BTS-1 Meg.	Br.-Blk.-Grn. FM RF Grid
68	1000Ω	½	66-2103340	BTS-1000	Br.-Blk.-Red FM RF Screen
69	68Ω	½	66-0683340		Blue-Gray-Blk. FM RF Cathode
70	68Ω	½	66-0683340		Blue-Gray-Blk. Decoupling
71	10KΩ	½	66-3103340	BTS-10K	Br.-Blk.-Or. FM Conv. Grid
72	1500Ω	½	66-2153340	BTS-1500	Br.-Grn.-Red FM Conv. Cathode
73	33KΩ	½	66-3333340	BTS-33K	Or.-Or.-Or. FM Conv. Plate Decoup.
74	15KΩ	½	66-3153340	BTS-15K	Br.-Grn.-Or. FM Osc. Grid
75	4700Ω	½	66-2473340	BTS-4700	Yl.-Vi.-Red FM Osc. Plate Decoup.
76	1 Meg.	½	66-5103340	BTS-1 Meg.	Br.-Blk.-Grn. AM Conv. Grid
77	2200Ω	½	66-2223340	BTS-2200	Red-Red-Red AM Conv. Cathode
78	33KΩ	½	66-3333340	BTS-33K	Or.-Or.-Or. AM Conv. Plate Decoup.
79	15KΩ	½	66-3153340	BTS-15K	Br.-Grn.-Or. AM Osc. Plate Load
80	68Ω	½	66-0683340		Blue-Gray-Blk. Decoupling
81	1 Meg.	½	66-5103340	BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
82	47Ω	½	66-0473340		Yl.-Vi.-Blk. 1st IF Cathode
83	1000Ω	½	66-2103340	BTS-1000	Br.-Blk.-Red 1st IF Screen
84	1000Ω	½	66-2103340	BTS-1000	Br.-Blk.-Red 1st IF Plate Decoup.
85	68Ω	½	66-0683340		Blue-Gray-Blk. Decoupling
86	120Ω	½	66-1123340		Br.-Red-Br. 2nd IF Cathode
87	1000Ω	½	66-2103340	BTS-1000	Br.-Blk.-Red 2nd IF Screen
88	1000Ω	½	66-2103340	BTS-1000	Br.-Blk.-Red 2nd IF Plate Decoup.
89	3.3 Meg.	½	66-5333340	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
90	47KΩ	½	66-3473340	BTS-47K	Yl.-Vi.-Or. Diode Filter
91	330KΩ	½	66-4333340	BTS-330K	Or.-Or.-Yl. Diode Load
92	47KΩ	½	66-3473340	BTS-47K	Yl.-Vi.-Or. Ratio Det. Diode Load
93	47KΩ	½	66-3473340	BTS-47K	Yl.-Vi,-Or. De-emphasis
94	100KΩ	½	66-4103340	BTS-100K	Br.-Blk.-Yl. Tone Comp.
95	10 Meg.	½	66-5103340	BTS-10 Meg.	Br.-Blk.-Blue AF Grid
96	470KΩ	½	66-4473340	BTS-470K	Yl.-Vi.-Yl. AF Plate Load
97	470KΩ	½	66-4473340	BTS-470K	Yl.-Vi.-Yl. Output Grid
98	120Ω	2	66-1123340	BW-2-120	Br.-Red-Br. Output Cathode
99	470Ω	1	66-1474340	BTA-470	Yl.-Vi.-Br. Filter
100	220Ω	1	66-1224340	BW-1-220	Red-Red-Br. "
128	15KΩ	½	66-3153340	BTS-15K	Br.-Grn.-Or. AM Oscillator Grid

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		PHILCO PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
1.1	1400Ω	3.4	38Ω	.7Ω	32-0[illegible]3-4	A-3477	T22S4F	A-2128	





IF=455 KC AM

IF=9.1 MC FM

STAGE GAIN MEASUREMENTS			
CONVERSION GAIN	3X	IN OUT	600KC 455KC
INPUT IF TRANS.	.2X		455KC
1st IF TUBE	18X		455KC
INTER. IF TRANS.	.4X		455KC
2nd IF TUBE	200X		455KC
OUTPUT IF TRANS.	.2X		455KC
AUDIO	25X		400 ~
OUTPUT	15X		400 ~

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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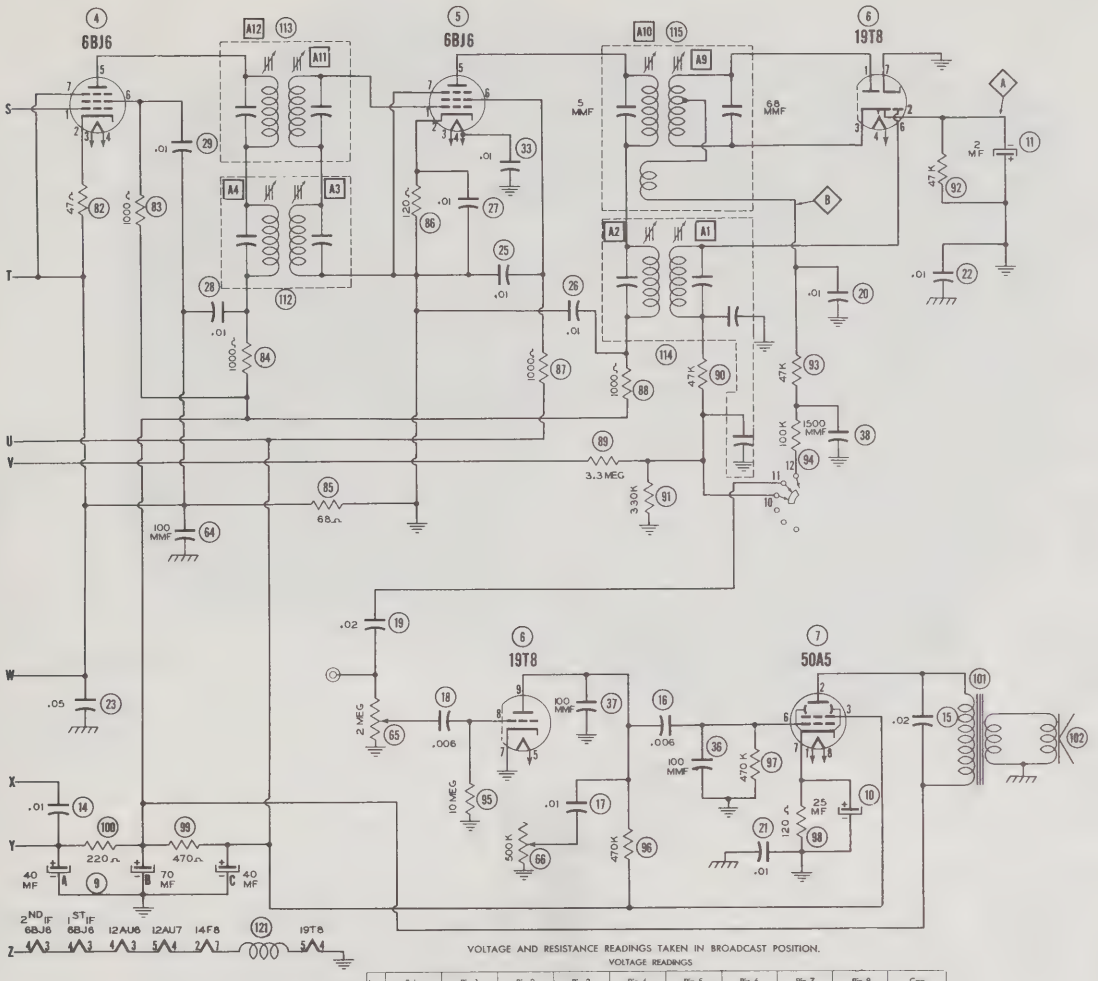

VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
‡ 1	12AU6	.3VDC	2.4VDC	45VAC	60VAC	95VDC	93VDC	2.8VDC	-	-
2	12AU7	45VDC	-1.5VDC§	2VDC	32VAC	45VAC	60VDC	-.6VDC	4VDC	39VAC
‡ 3	14F8	-.5VDC§	32VAC	80VDC	2VDC	3.2VDC	55VDC	18VAC	1.5VDC	-
4	6BJ6	0V.	1.6VDC	60VAC	65VAC	95VDC	100VDC	1.4VDC	-	-
5	6BJ6	0V.	.1VDC	65VAC	70VAC	55VDC	90VDC	0V.	-	-
‡ 6	19T8	-.4VDC	-1VDC	0V.	0V.	18VAC	-.5VDC	0V.	-.8VDC	44VDC
7	50A5	117VAC	95VDC	95VDC	0V.	0V.	0V.	5.8VDC	7CVAC	-
8	117Z3	117VAC	0V.	0V.	117VAC	117VAC	120VDC	0V.	-	-

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
‡ 1	12AU6	1 Meg.	200Ω	40Ω	50Ω	80KΩ	81KΩ	270Ω	-	-
2	12AU7	95KΩ	15KΩ	130Ω	30Ω	40Ω	110KΩ	4.6 Meg.	2.3KΩ	36Ω
‡ 3	14F8	15KΩ	30Ω	85KΩ	130Ω	1.6KΩ	110KΩ	20Ω	10KΩ	-
4	6BJ6	4.6 Meg.	115Ω	50Ω	54Ω	80KΩ	80KΩ	68Ω	-	-
5	6BJ6	11Ω	47Ω	54Ω	58Ω	80KΩ	80KΩ	0Ω	-	-
‡ 6	19T8	INF.	47KΩ	INF.	0Ω	20Ω	380KΩ	0Ω	10 Meg.	550KΩ
7	50A5	80Ω	80KΩ	60KΩ	0Ω	0Ω	470KΩ	120Ω	58Ω	-
8	117Z3	80Ω	INF.	0Ω	80Ω	80Ω	80KΩ	INF.	-	-

‡ VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer 2-3/4" from left edge of dial mounting bracket.

Use insulated alignment screwdriver for all adjustments.

Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.

AM ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet. Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to terminal #1 on ant. terminal strip. Low side to B-.	455KC	AM (Counter-clockwise)	Tuning cap. fully closed	Across voice coil	A1,A2, A3,A4, A5,A6	Adjust for maximum output in order given. Do not repeat. If isolation transformer is not used reduce dummy antenna to .001 MFD to reduce hum modulation.
2		Connect sig. gen. to radiation loop. (Loop of receiver must be connected to chassis.	1600KC	"	8-7/16" from left edge of dial mtg. bracket.	"	A7	Adjust for maximum output.
3		Loop	1500KC	"	Tune for maximum output.	"	A8	" " " "

FM IF ALIGNMENT USING AM SIGNAL GENERATOR, VTVM & OUTPUT METER

If VTVM is not available a 20,000Ω per volt DC voltmeter may be used.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4	.1 MFD.	High side to Pin 1 (grid) of 6BJ6 1st IF Tube (4). Low side to B-.	9.1MC (400 ∿ AM modulation)	FM (clockwise)	Tuning cap. fully closed	DC probe to Point (A). Common to B-.	A9,A10, A11,A12	Adjust for maximum deflection. Attenuate output of sig. gen. to maintain deflection of approx 10 volts once these adjustments are satisfactory do not disturb again with exception of A9 in Step 6.
5	.1 MFD.	High side to Pin 1 (grid) of 14F8. Low side to B-.	"	"	"	"	A13, A14	Adjust for maximum deflection. Repeat until no further improvement can be made. Once they are satisfactory do not change either of them.
						OUTPUT METER		
6	.1 MFD.	High side to Pin 1 (grid) of 14F8. Low side to B-.	9.1MC (400 ∿ AM Modulation)	FM (Clockwise)	Tuning cap. fully closed	Across voice coil	A9	Adjust for minimum output. Make this adjustment very carefully as misalignment will result in distortion on FM reception. Continue with FM RF Alignment in Step 7.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use freq. modulated signal with 60 ∿ modulation & 450KC sweep. Use 120 ∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	SCOPE CONNECT	ADJUST	REMARKS
4	.01 MFD	High side to Pin 1 (grid) of 6BJ6. 1st IF Tube (4). Low side to B-.	10.7MC (Freq. Mod.)	FM (Clockwise)	Tuning cap. fully closed	Vertical input to Point (A). Ground to B-.	A10,A11 A12	Disconnect 2 MFD cap. (11) from Point A . Adjust A10 A11 & A12 for maximum amplitude, symmetry and coincidence of pattern per Fig. 1.
5	.01 MFD.	High side to Pin 8 (grid) of 14F8. Low side to B-.	"	"	"	"	A13,A14	Adjust for maximum amplitude, symmetry and coincidence of pattern per Fig. 1. Reconnect 2 MFD cap. (11) to Point A .
6	.01 MFD.	"	"	"	"	Vertical input to Point (B). Ground to B-.	A9	Adjust for maximum straightness of crossover lines with crossover occurring at center of pattern per Fig. 2. Continue with FM-RF Alignment in Step 7.

FM RF ALIGNMENT

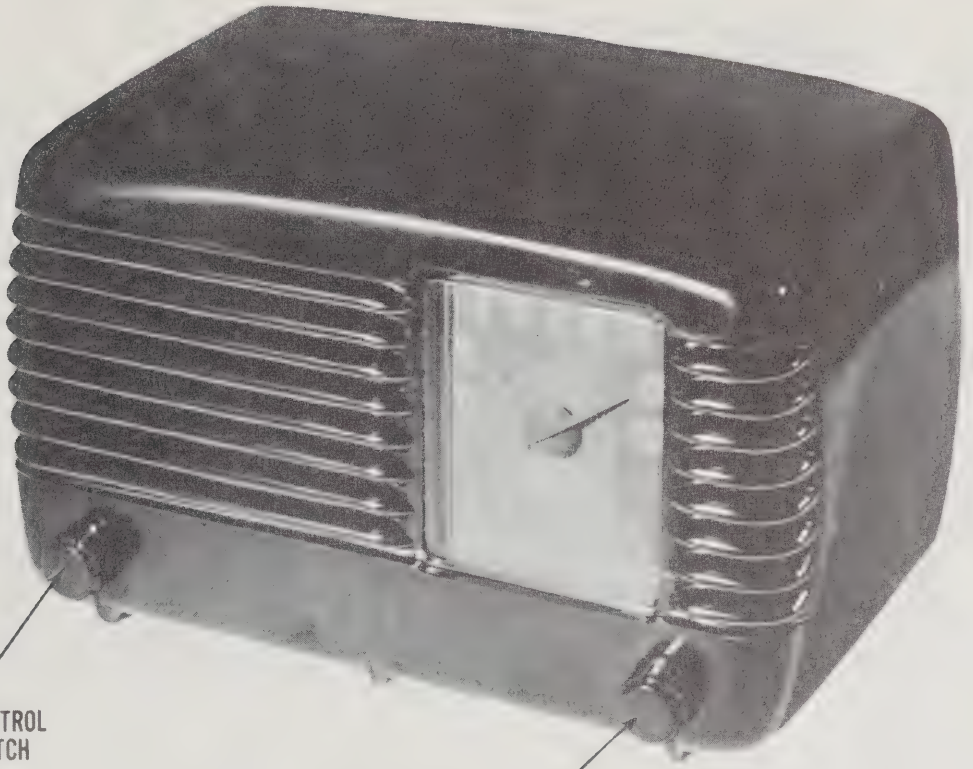
Use tuning wand for checking adjustment of FM coils. If deflection increases when the iron end of wand is inserted in coil, compress the turns slightly. If deflection increases when the brass end of wand is inserted in coil, spread the turns slightly. Correct adjustment is indicated when insertion of either end of wand causes a decrease in deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
7	Direct	High side to Pin 2 of FM Ant. Socket. Low side to B-.	105MC	FM (Clockwise)	7-7/16" from left edge of dial mtg. brkt.	DC probe to Point (A). Common to B-.	A15	Adjust for maximum deflection.
8	Direct	"	"	"	Tune for maximum deflection.	"	A16	Rock tuning cap. and adjust for maximum deflection.
9	Direct	"	"	"	"	"	A17	Adjust for maximum deflection.
10	Direct	"	92MC	"	4-3/8" from left edge of dial mtg. bracket.	"	FM Osc. Coil (109)	Adjust for maximum deflection. (see pre-alignment notes).
11	Direct	"	"	"	Tune for maximum deflection.	"	FM-RF Coil (107)& FM Ant. Coil (106)	Adjust for maximum deflection. (see pre-alignment notes. Repeat Steps 7 thru 11 until no further improvement can be made.

FIG. 1

FIG. 2

PHILCO MODELS
49-500, 49-500I, 49-506



PHILCO MODELS
49-500, 49-500I, 49-506

PHILCO MODEL 49-500

TRADE NAME	Philco, Model 49-500, 49-500I, 49-506
MANUFACTURER	Philco Corp., Tioga & "C" Sts., Philadelphia, Pa.
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types, 7A8 Converter, 14A7 IF Amp., 14B6 Det.-AVC-AF, 50A5 Power Output, 35Z5 Rectifier.
POWER SUPPLY	105-120 Volts AC-DC
TUNING RANGE—BROADCAST	540-1620KC RATING .22 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer if available. If not, connect a .1 MFD capacitor in series with low side of signal generator and B-.

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to Pin 6 (grid) of 7A8. Low side to B-.	455KC	Tuning cap. fully closed.	Across voice coil	A1,A2, A3,A4.	Turn A4 completely clockwise Then adjust A1 thru A4 for maximum output in order given
2	100MMFD.	High side to ext. ant. lug. Low side to B-.(Loop connected, ext. ant. lug. dis-connected from chassis.	1600KC	1600KC	"	A5	Adjust for maximum output.
3	100MMFD.	"	1500KC	Tune for maximum output.	"	A6	" " " "

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	7A8	7A8	8U	
2	IF Amp.	14A7	14A7	7V	
3	2nd Det.-AVC-1st Audio	14B6	14B6	8W	
4	Power Output	50A5	50A5	6AA	
5	Rectifier	35Z5	35Z5	4D	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	30	150	30-2573	PRS-A150/20-30 PRS150/24	EZ-2215	DSB403020-150	D10095	Filter-Orange
B	25	150						" -Blue
C	20	150						Decoupling-Red
7	.04	400	45-3500-2	484-04	DT4S4	ST-6-04	TC-14	Line Filter-See Note
8	.1	400	30-4644-1				72P2	Line Isolation
9	.02	400	61-0108	484-02	DT4S2	ST-4-02	TC-12	Output Plate Bypass
10	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
11	.01	400	61-0120	484-01	DT4S1	ST-4-01	TC-11	" "
12	.05	200	61-0122	484-05	DT2S5	ST-4-05	TC-15	AVC Filter
13	.05	200	61-0122	484-05	DT2S5	ST-4-05	TC-15	Screen Decoupling
14	220	300	62-122001001	1468-0002	5W5T2	MO.5-32	1FM-32	Output Grid Bypass-Cer.
15	47	500	60-00515307	1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap.
16	.00	500	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	RF Coupling
17	5	300	60-90505007	1468-000005	5W5V5	MO.5-55	MS-55	Ext. Ant. Coupling-Cer.

Note-Part No. 30-1226-17 used in Model 49-506.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PHILCO PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
18A	500KΩ	½	33-[illegible]	D1G-133	M-60-Z	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 18A per instructions
C	Switch		" "	41	SW-A	" " " " "

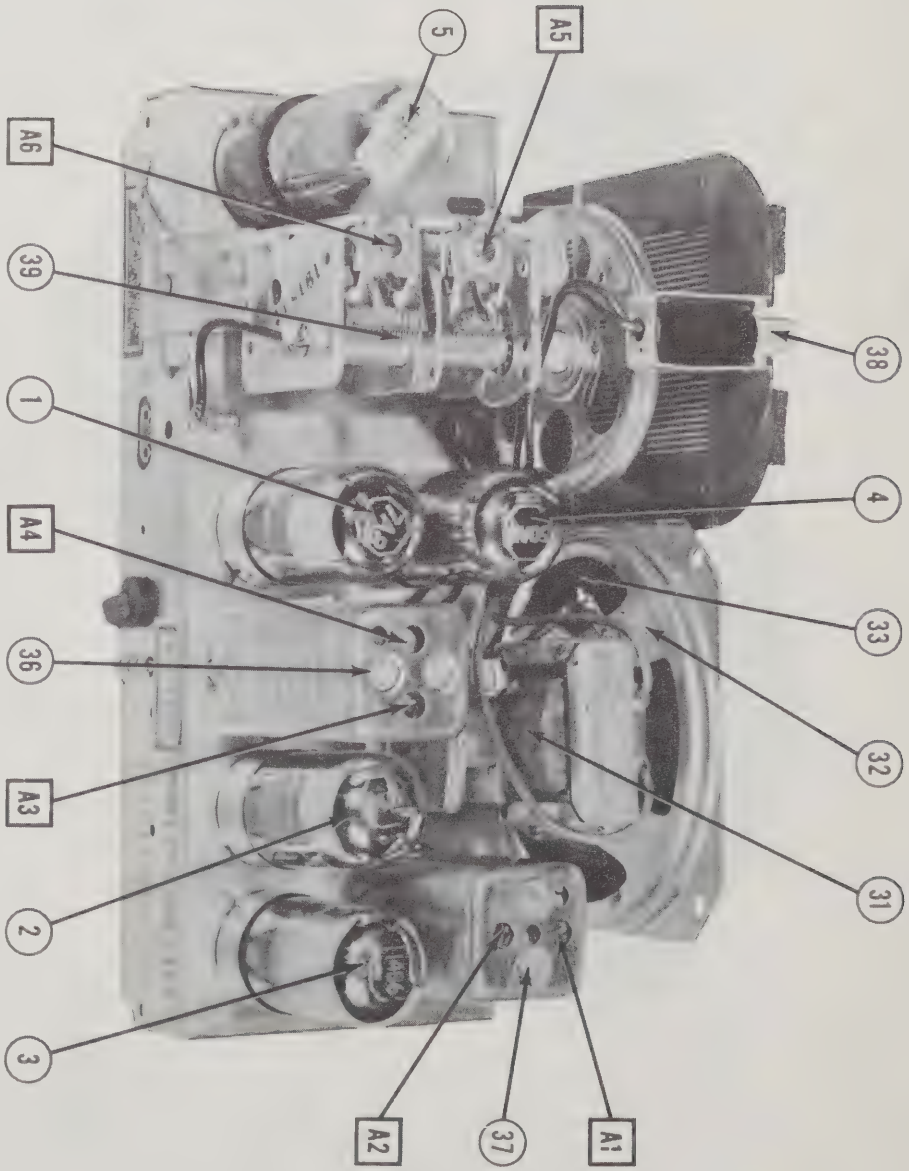
RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PHILCO PART No.	IRC PART No.	IDENTIFICATION CODES
19	1 Meg.	½	66-5103340	BTS-1 Meg.	Br.-Blk.-Grn. Conv. Grid
20	100KΩ	½	66-4103340	BTS-100K	Br.-Blk.-Yl. Osc. Grid
21	150KΩ	½	66-4153340	BTS-150K	Br.-Grn.-Yl. Ant. Loading
22	27KΩ	½	66-3273340	BTS-27K	Red-Vi.-Or. Screen Dropping
23	3.3 Meg.	½	66-5333340	BTS-3.3 Meg.	Or.-Or.-Grn. AF Grid
24	470KΩ	½	66-4473340	BTS-470K	Yl.-Vi.-Yl. AF Plate Load
25	470KΩ	½	66-4473340	BTS-470K	Yl.-Vi.-Yl. Output Grid
26	130Ω	½	66-1123340	BW-½-150	Br.-Or.-Br. Output Cathode
27	1200Ω	½	66-2133340	BTS-1200	Br.-Red-Red Filter
28	220Ω	1	66-1224340	BW-1-220	Red-Red-Br. Filter
29	150KΩ	½	66-4153340	BTS-150K	Br.-Grn.-Yl. Line Isolation
30	2.2 Meg.	½	66-5223340	BTS-2.2 Meg.	Red-Red-Grn. AVC Network

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: PHILCO PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	INSTALLATION NOTES
31	1750Ω	3.1Ω	175Ω	.7Ω	Part of 36-1614	A-3876#	T22S45#	A-2028#	#Bend mounting tabs down, file out slots and mount on original bracket.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA PHILCO PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
32	FIELD [illegible]	VC IMP. 3.1Ω	56-1814	ST-113† Mod. P4-X	[illegible]	†Fabricate new mounting bracket.
33	CONE DIA. 4"	VC DIA. 3/4"				

R F COILS

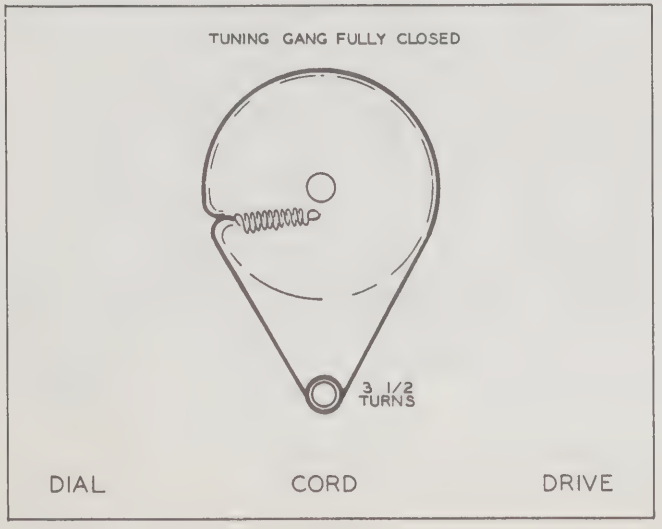
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA PHILCO PART No.	REPLACEMENT DATA MEISSNER PART No.	
34	Loop Ant.		3.2Ω	32-4052-5†		†32-4052-28 used in model 49-506.
35	Osc. Coil	2.6Ω	7.5Ω	32-4263		
36	Input IF	24.1Ω	23.6Ω	32-3967	16-6658	
37	Output IF	20.8Ω		32-3952	16-6670	

DIAL LIGHT

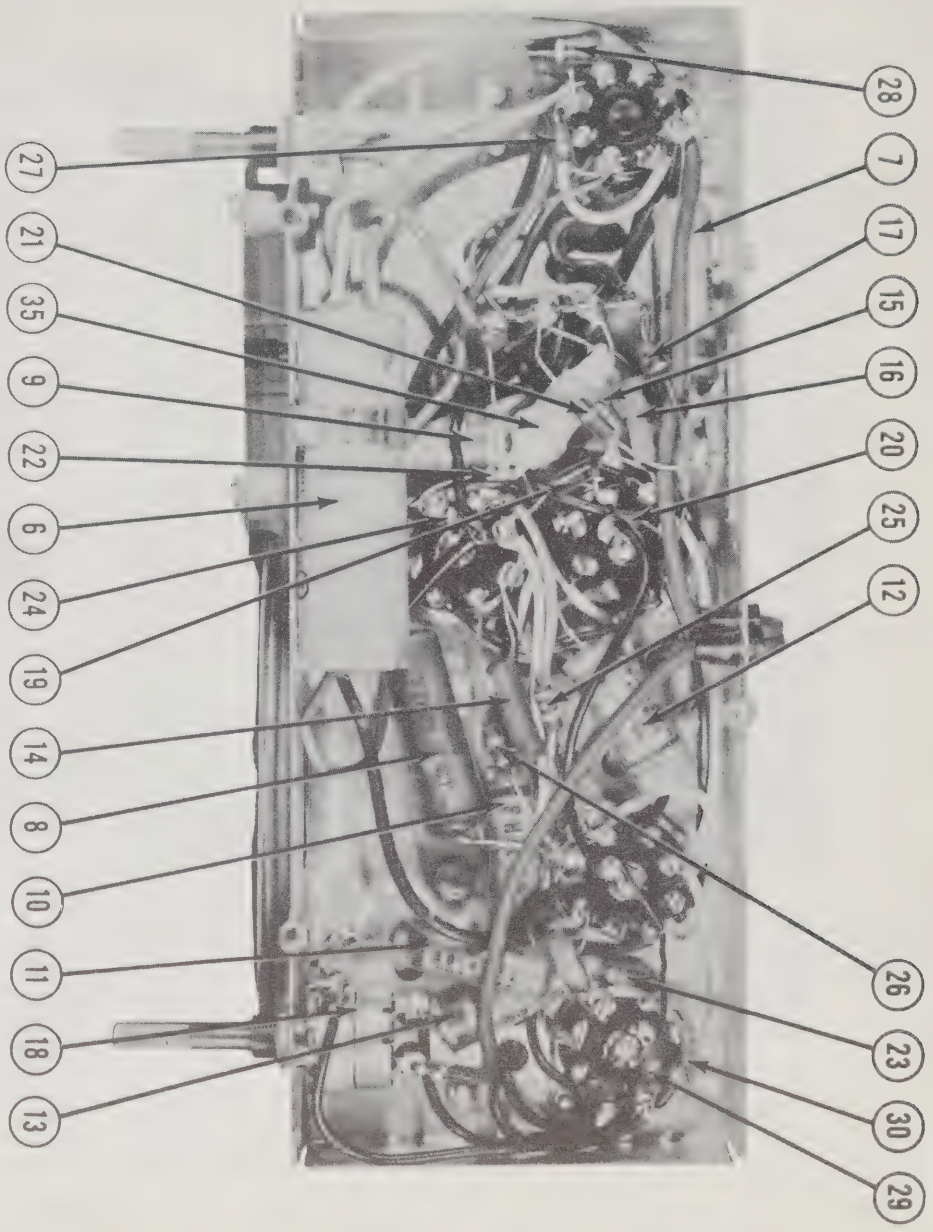
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA PHILCO PART No.		INSTALLATION NOTES
38	Bayonet	6-8	0.15	Brown	34-2067		Type 47

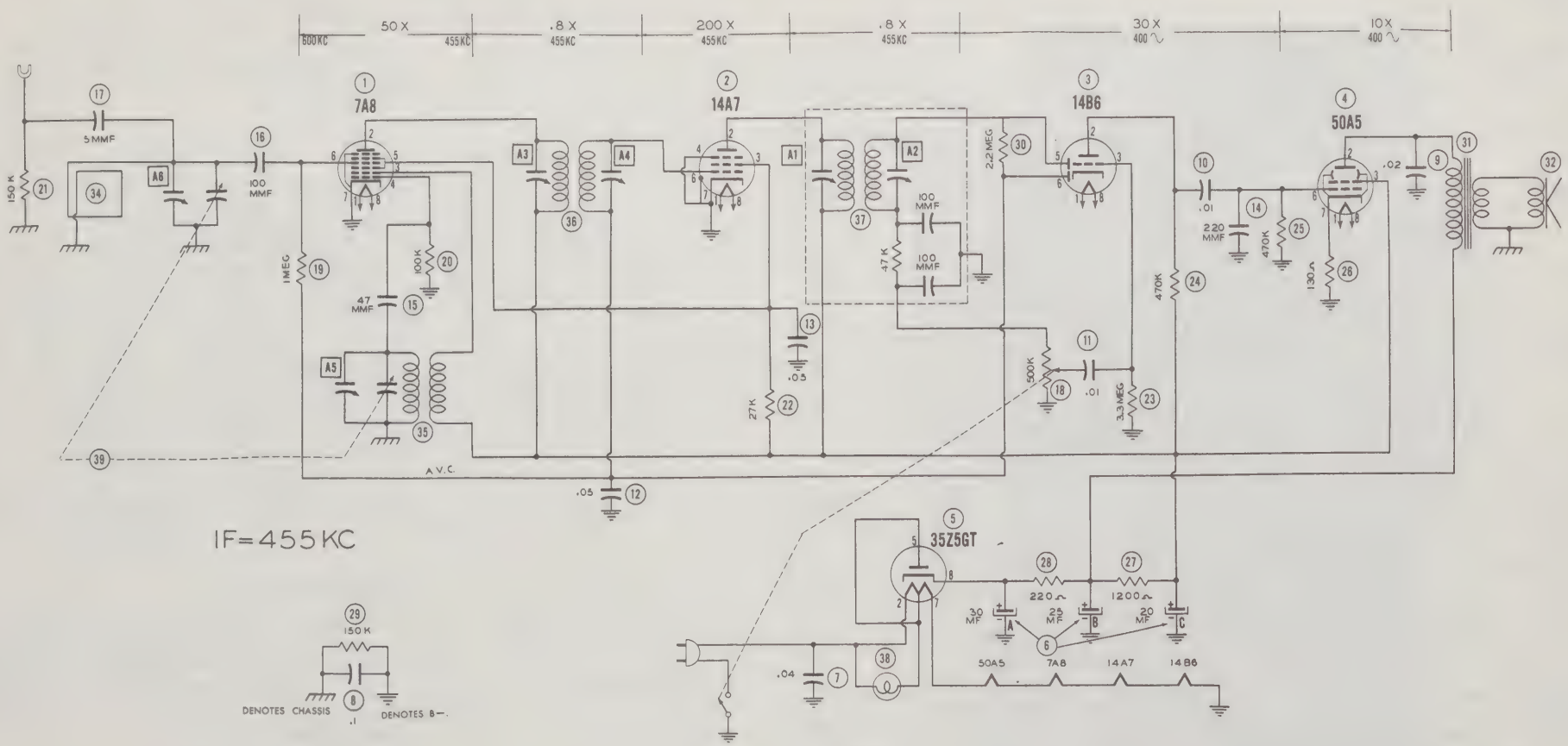
MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
39	2 Gang Var. Cap.	32-2727-1	(19-471MMF, 34-178MMF)
	Dial Scale	27-5965	49-500
	" "	27-5965-1	49-500I
	" "	27-5978-2	49-506
	Dial Pointer	27-4361-1	49-500, 49-500I
	" "	54-4505	49-506



CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	7A8	31VAC	80VDC	80VDC	-8.2VDC§	40VDC	-.4VDC	0V.	24VAC
2	14A7	12VAC	80VDC	40VDC	0V.	0V.	-.4VDC	0V.	24VAC
3	14B6	12VAC	50VDC	-.4VDC	0V.	-.4VDC	-.4VDC	0V.	0V.
4	50A5	24VAC	100VDC	100VAC	0VDC	-.47VDC	0V.	0VDC	31VAC
5	35Z5	0V.	117VAC	113VAC	90VDC	113VAC	105VDC	85VAC	116VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	7A8	31Ω	80KΩ	80KΩ	110KΩ	110KΩ	3.7 Meg.	0Ω	25Ω
2	14A7	13Ω	80KΩ	110KΩ	0Ω	0Ω	2.7 Meg.	0Ω	25Ω
3	14B6	13Ω	550KΩ	3.3 Meg.	0Ω	550KΩ	2.7 Meg.	0Ω	0Ω
4	50A5	35Ω	70KΩ	80KΩ	600KΩ	3 Meg.	470KΩ	130Ω	31Ω
5	35Z5	INF.	110Ω	105Ω	80KΩ	105Ω	80KΩ	85Ω	80KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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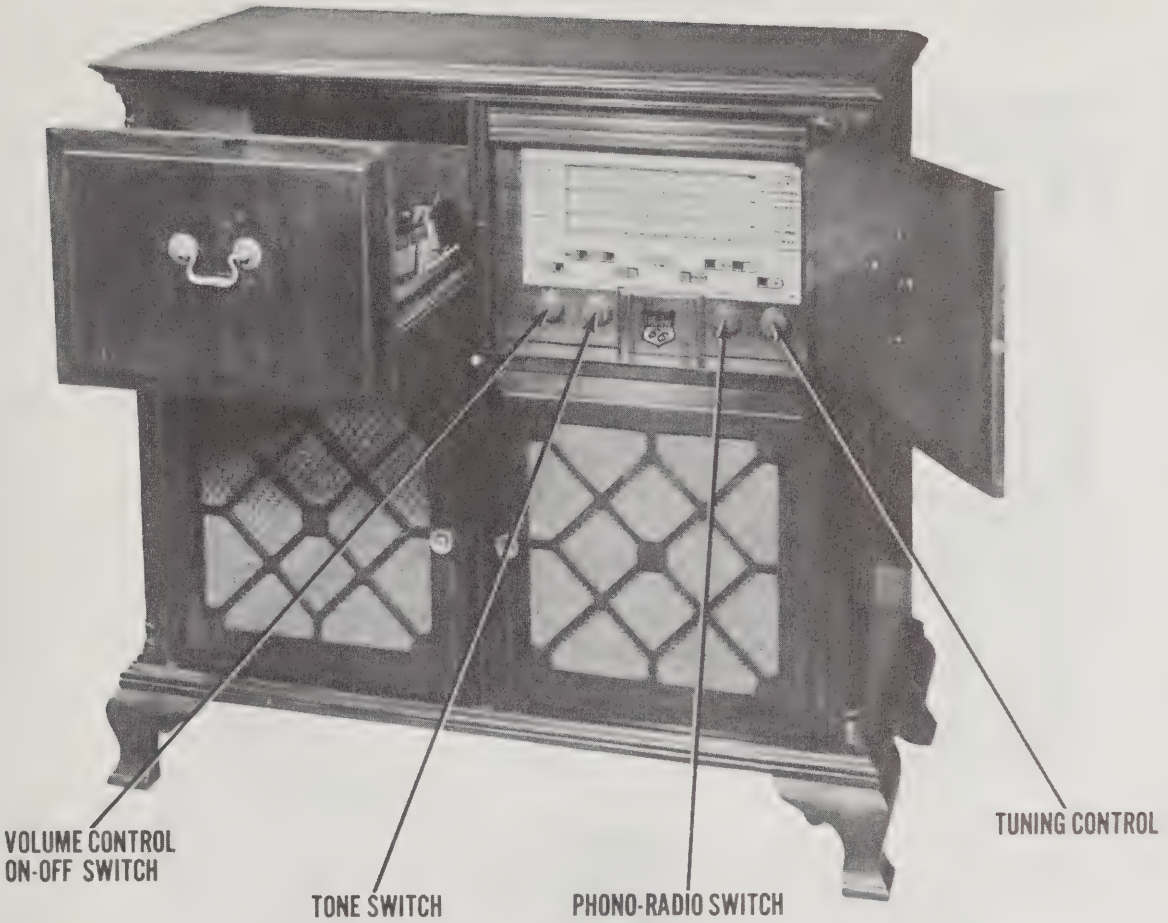
4818-19

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

PHILLIPS 66
MODEL 3-81A



PHILLIPS 66
MODEL 3-81A

PHILLIPS 66 MODEL 3-81A

TRADE NAME	Phillips 66, Model 3-81A
SUPPLIER	Phillips Petroleum Co., Bartlesville, Okla.
TYPE SET	AC Operated Combination Phono-Radio, 2 Band AM-FM Superheterodyne Receiver with Loop Antenna.
TUBES(FOURTEEN)	Types, 7H7 FM RF Amp., 6SB7Y FM Mixer, 7A4 FM Osc., 7Q7 AM Converter, 7H7 1st IF Amp., 7H7 2nd IF Amp., 7H7 AM Det.-FM 3rd IF, 7C7 FM Cath. Follower, 7A6 FM Ratio Det., 1273 AF Amp., 7A4 Cathode Follower Driver, (2) 7C5 Power Output, 5U4G Rectifier.
POWER SUPPLY	110-120 Volts AC
RATING	1.07 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	535-1720KC SHORT WAVE 5.6-18.5MC FREQ. MOD. 87.4-108.7MC

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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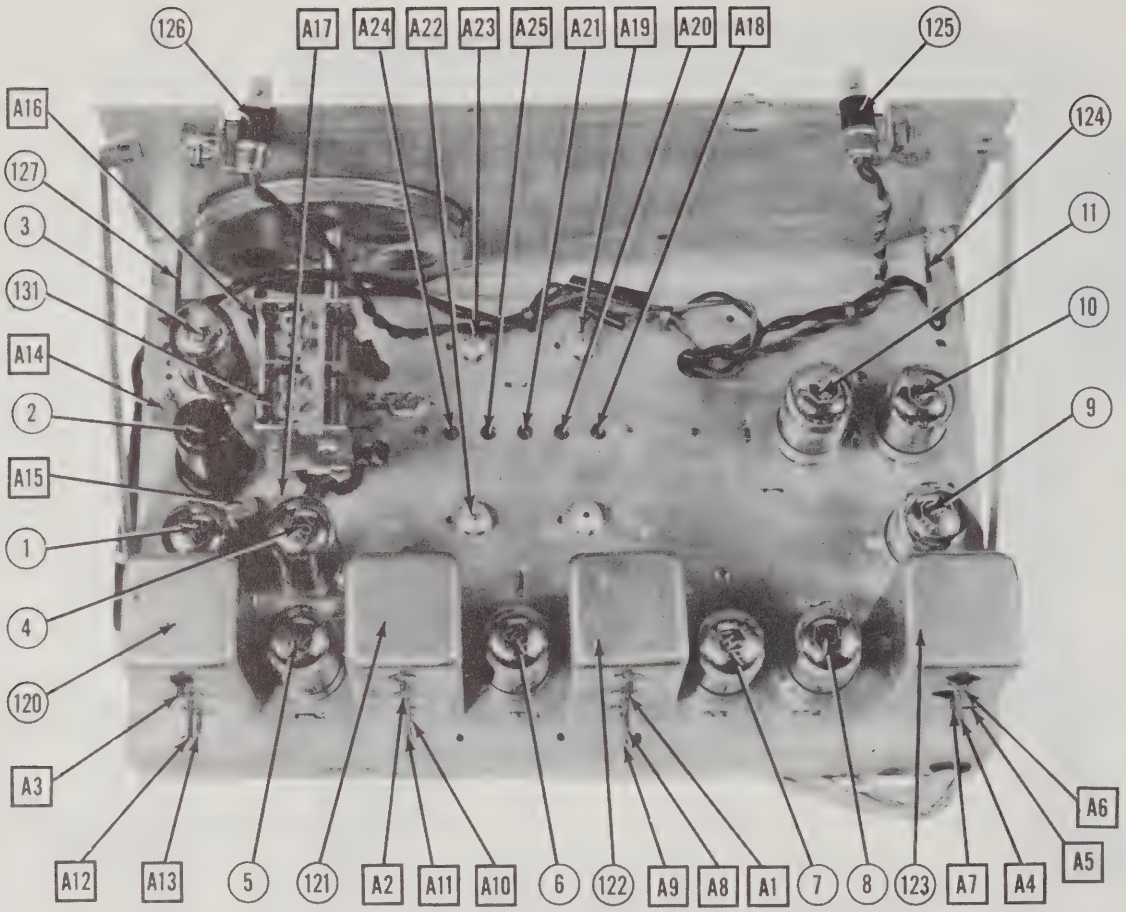
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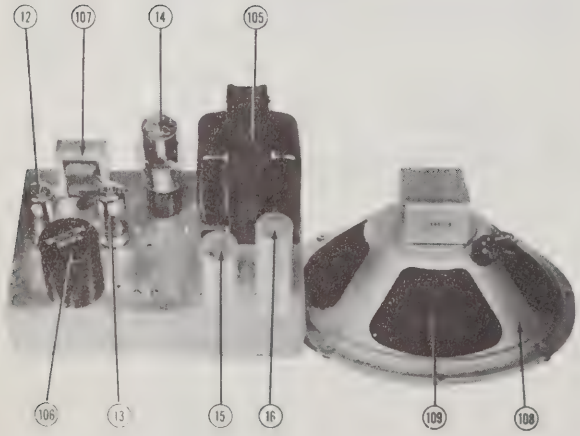
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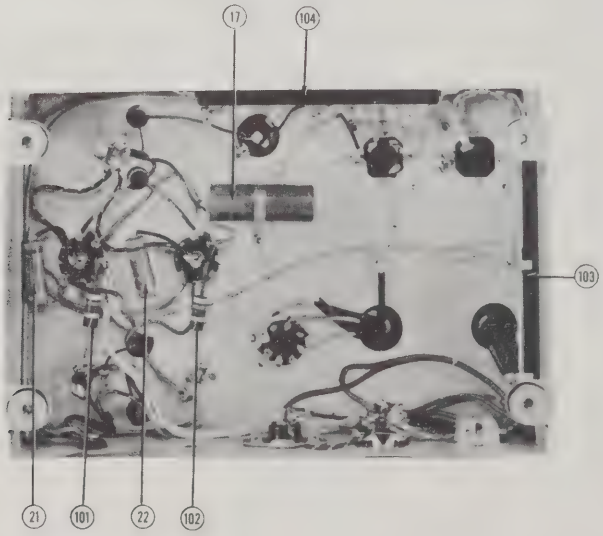
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101
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A
C
CE 5X
SMITH SOUND

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: PHILLIPS 66 PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	FM RF Amp.	7H7	7H7	8V	
2	FM Mixer	6SB7Y	6SB7Y	8R	
3	FM Oscillator	7A4	7A4	5AC	
4	AM Converter	7Q7	7Q7	8AL	
5	1st IF Amp.	7H7	7H7	8V	
6	2nd IF Amp.	7H7	7H7	8V	
7	AM Det.-FM 3rd IF	7H7	7H7	8V	
8	FM Cath. Follower	7C7	7C7	8V	
9	FM Ratio Det.	7A6	7A6	7AJ	
10	AF Amp.	1273	1273		
11	Cath. Follower Driver	7A4	7A4	5AC	
12	Power Output	7C5	7C5	6AA	
13	" "	7C5	7C5	6AA	
14	Rectifier	5U4G	5U4G	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: PHILLIPS 66 PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
15A	16	450	CE1-3A85	AF444J	UP2222451	DY-3x20-450	EL-420†	◆ Filter
B	16	450						■ "
C	16	450						▲ "
16	80	450	CE1-1A88	AF88J‡	UP8045	DY-80-450	EL-240‡	"
17A	25	50	CE-83	PRSA150/30-30	E22215	DSB-2x30-150	TA-330	Cathode Bypass
B	25	50						" "
18	25	25	CE-86	PRS25/25	BR252A	M-25-25	TA-25	" "
19	5	50	CE-88	PRS150/4	BR550	M-8-150	TA-55	Stabilizing Cap.
20	.1	600		684-.1	DT6P1	ST-6-1	TC-1	Line Filter
21	.005	1000		1084-005	MD16D3	STM-16-003	TR-25	Output Plate Bypass
22	.005	1000		1084-005	MD16D3	STM-16-003	TR-25	" " "
23	.01	600		684-01	DT6S1	ST-6-01	TC-11	Audio Coupling
24	.05	600		684-05	DT6S5	ST-6-05	TC-15	AF Screen Bypass
25	.01	600		684-01	DT6S1	ST-6-01	TC-11	Audio Coupling
26	.003	600		684-003	DT6D3	ST-6-003	TC-23	Tone Comp.
27	.003	600		684-003	DT6D3	ST-6-003	TC-23	" "
28	.01	600		684-01	DT6S1	ST-6-01	TC-11	Audio Coupling
29	.01	600		684-01	DT6S1	ST-6-01	TC-11	RF Bypass
30	.01	600		684-01	DT6S1	ST-6-01	TC-11	FM Plate Bypass
31	.01	600		684-01	DT6S1	ST-6-01	TC-11	Filament Bypass
32	.01	600		684-01	DT6S1	ST-6-01	TC-11	RF Bypass Pwr. Supply
33	.01	600		684-01	DT6S1	ST-6-01	TC-11	3rd IF Decoupling
34	.01	600		684-01	DT6S1	ST-6-01	TC-11	3rd IF Screen Bypass
35	.01	600		684-01	DT6S1	ST-6-01	TC-11	2nd IF Decoupling
36	.01	600		684-01	DT6S1	ST-6-01	TC-11	2nd IF Screen Bypass
37	.01	600		684-01	DT6S1	ST-6-01	TC-11	Filament Bypass
38	.01	600		684-01	DT6S1	ST-6-01	TC-11	AVC Filter-See Note
39	.01	600		684-01	DT6S1	ST-6-01	TC-11	1st IF Decoupling
40	.01	600		684-01	DT6S1	ST-6-01	TC-11	1st IF Screen Bypass
41	.01	600		684-01	DT6S1	ST-6-01	TC-11	1st IF Cathode Bypass
42	.5	600		684-.5	DT6D5	ST-6-5	TC-5	RF Bypass Pwr. Supply
43	.01	600		684-01	DT6S1	ST-6-01	TC-11	Mixer Plate Decoupling
44	.01	600		684-01	DT6S1	ST-6-01	TC-11	Mixer Screen Bypass
45	.01	600		684-01	DT6S1	ST-6-01	TC-11	Mixer Cathode Bypass
46	.01	600		684-01	DT6S1	ST-6-01	TC-11	RF Bypass Pwr. Supply
47	.01	600		684-01	DT6S1	ST-6-01	TC-11	Conv. Screen Bypass
48	.05	200		484-05	DT2S5	ST-4-05	TC-15	AVC Filter
49	.01	600		684-01	DT6S1	ST-6-01	TC-11	RF Bypass Power Supply
50	220	500		1468-00025	5W5T25	MO.5-325	1FM-325	AF Plate Bypass
51	47	500		1468-00005	5W5Q5	MO.5-45	1FM-45	Tone Comp.
52	470	500		1468-0005	5W5T5	MO.5-35	1FM-35	" "
53	1000	500		1468-001	1W5D1	MO.3-21	1FM-21	" " - See Note
54	220	500		1468-00025	5W5T25	MO.5-325	1FM-325	De-emphasis
55	4700	500		1467-005	1D5D5	MW.5-25	1FM-25	Diode Load Cap.
56	100	500		1468-001	5W5T1	MO.5-31	1FM-31	IF Coupling
57	22	500		1468-000025	5W5Q25	MO.5-425	MS-425	Mixer Cathode Bypass
58	100	500		1468-0001	5W5T1	MO.5-31	1FM-31	Filament Bypass

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (DRIVER)

ITEM No.	RATING: TURNS RATIO PRI. to SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: PHILLIPS 66 PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: THORDAR'N PART No.	REPLACEMENT DATA: MERIT PART No.	INSTALLATION NOTES
106	3 to 1	1130Ω	550Ω CT	TA-10		T20D77‡		‡Drill new mounting holes.

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: PHILLIPS 66 PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: THORDAR'N PART No.	REPLACEMENT DATA: MERIT PART No.	INSTALLATION NOTES
107	9000Ω CT	3.9Ω	400Ω CT	.3Ω		A-3823	T22S56	A-3936	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: PHILLIPS 66 PART No.	REPLACEMENT DATA: JENSEN PART No.	REPLACEMENT DATA: QUAM PART No.	INSTALLATION NOTES
108	FIELD	VC IMP.	EH-16	ST-102*	12A6*	*Replace output transformer to match 6-8Ω voice coil.
	PM	3.9Ω		Mod. P12-8		
109	CONE DIA. 11½"	VC DIA. 1"				

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: PHILLIPS 66 PART No.	REPLACEMENT DATA: MEISSNER PART No.	
110	Ant. Load. Coil		0Ω	LF-8		
111	BC Ant.Coil	2.3Ω	17.3Ω	LR-14	14-1056	
112	SW " "	0Ω	1Ω	LR-15		
113	FM Ant.Coil		0Ω	LR-12		
114	Plate Coup. Coil		2.5Ω	LF-7		
115	FM RF Coil		0Ω	LR-13		
116	FM RF Pad Coil		0Ω	LF-8		
117	BC Osc.Coil	.2Ω	4Ω	LO10	14-1060	
118	SW " "		.1Ω	LO11		
119	FM " "		0Ω	LO9		
120A	1st IF AM	1Ω		TM-6		
B	1st IF FM	.1Ω	.1Ω			
121A	2nd IF AM	1Ω**		TM-7		**Includes both primaries.
B	2nd IF FM					
122A	3rd IF AM	1Ω**		TM-8		
B	3rd IF FM					
123	Det. Coil		.2Ω	TM-17		

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: PHILLIPS 66 PART No.	REPLACEMENT DATA:	INSTALLATION NOTES
124-128	Bayonet	6-8	0.15	Brown			Type 47

MISCELLANEOUS

ITEM No.	PART NAME	PHILLIPS 66 PART No.	NOTES
129	Switch	SR18	Band-Phono
130	"	SR19	Tone
131	Tuning Gang	CV15	AM (13-417MMF, 13-417MMF)

PARTS LIST AND DESCRIPTIONS (Continued)

59	220	500		1468-00025	5W5T25	MO.5-325	1FM-325	Osc. Grid Cap.
60	25	500		1469-000025	5R5Q25	MOS.5-425	MS-425	Grid Feedback
61	470	500		1468-0005	5W5T5	MO.5-35	1FM-35	Filament Bypass
62	25	500		1469-000025	5R5Q25	MOS.5-425	1FM-425	Fixed Pad
63	100	500		1468-0001	5W5T1	MO.5-31	1FM-31	RF Coupling
64	220	500		1468-00025	5W5T25	MO.5-325	1FM-325	RF Screen Bypass
65	33	500		1468-00004	5W5Q4	MO.5-44	1FM-44	RF Coupling
66	3600	500						Fixed Pad
67	100	500		1468-0001	5W5T1	MO.5-31	1FM-31	Osc. Grid Cap.
68	47	500		1468-00005	5W5Q5	MO.5-45	1FM-45	Fixed Trimmer

†Omit one section.
‡Parallel sections to obtain desired capacity.
Note-Not used in all models.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	PHILLIPS 66 PART No.	IRC PART No.	CLAROSTAT PART No.	
69	1 Meg.	½	RP11-105			Volume Control & Sw. tapped @ 150KΩ & 300KΩ

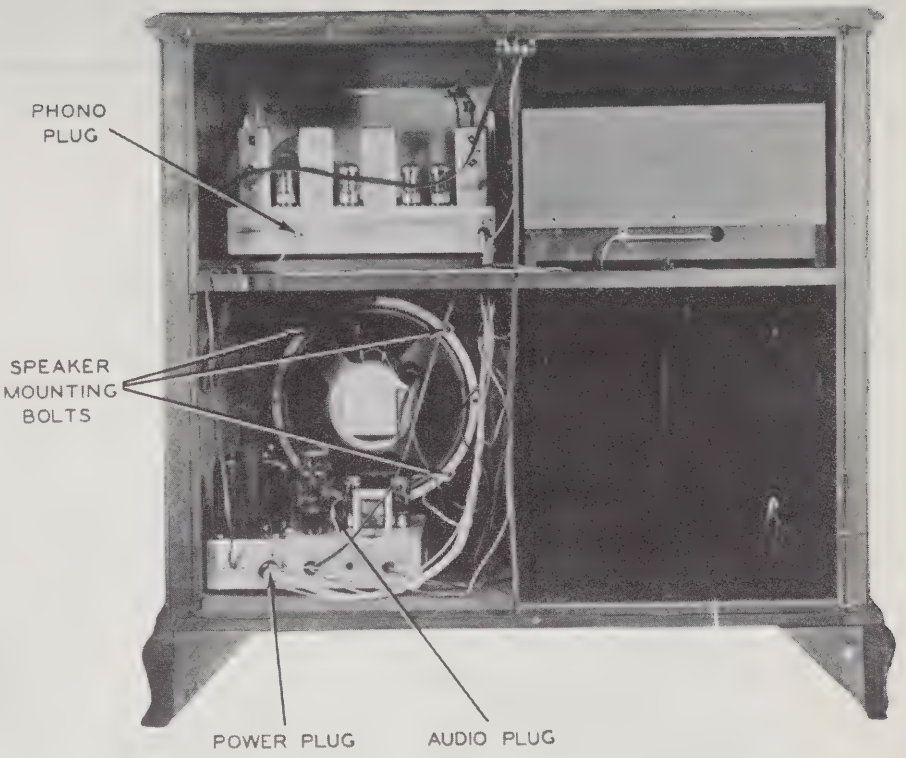
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	PHILLIPS 66 PART No.	IRC PART No.	
70	15KΩ	‡		BTS-15K	Br.-Grn.-Or. RF Screen
71	2.2 Meg.	‡		BTS-2.2 Meg.	Red-Red-Grn. AVC Network
72	4700Ω	2		BT-2-4700	Yl.-Vi.-Red RF Plate Load
73	22KΩ	‡		BTS-22K	Red-Red-Or. AM Osc. Grid
74	22KΩ	1		BTA-22K	Red-Red-Or. AM Osc. Screen
75	4700Ω	1		BTA-4700	Yl.-Vi.-Red FM Osc. Plate
76	12KΩ	‡		BTS-12K	Br.-Red-Or. FM Osc. Grid
77	220Ω	‡			Red-Red-Br. Mixer Cathode
78	22KΩ	2		BT-2-22K	Red-Red-Or. Mixer Screen
79	150Ω	‡			Br.-Grn.-Br. 1st IF Cathode
80	33KΩ	‡		BTS-33K	Or.-Or.-Or. 1st IF Screen
81	150Ω	‡			Br.-Grn.-Br. 2nd IF Cathode
82	33KΩ	‡		BTS-33K	Or.-Or.-Or. 2nd IF Screen
83	2.2 Meg.	‡		BTS-2.2 Meg	Red-Red-Grn. AVC Network
84	470KΩ	‡		BTS-470K	Yl.-Vi.-Yl. Diode Load
85	1000Ω	‡		BTS-1000	Br.-Blk.-Red Decoupling
86	47KΩ	‡		BTS-47K	Yl.-Vi.-Or. FM 3rd IF Screen
87	15KΩ	‡		BTS-15K	Br.-Grn.-Or. FM 3rd IF Plate
88	47KΩ	‡		BTS-47K	Yl.-Vi.-Yl. FM Cathode Follower Grid
89	2200Ω	‡		BTS-2200	Red-Red-Red FM Cathode Follower Cathode
90	47KΩ	‡		BTS-47K	Yl.-Vi.-Or. De-emphasis
91	22KΩ	‡		BTS-22K	Red-Red-Or. Ratio Det. Diode Load
92	470KΩ	‡		BTS-470K	Yl.-Vi.-Yl. Phono Shunt
93	2.2 Meg.	‡		BTS-2.2 Meg.	Red-Red-Grn. AF Amp. Grid
94	2200Ω	‡		BTS-2200	Red-Red-Red AF Amp. Cathode
95	1 Meg.	‡		BTS-1 Meg.	Br.-Blk.-Grn. AF Amp. Screen
96	220KΩ	‡		BTS-220K	Red-Red-Yl. AF Amp. Plate Load
97	68KΩ	‡		BTS-68K	Blue-Gray-Or. Tone Compensation
98	22KΩ	‡		BTS-22K	Red-Red-Or. " "
99	2.2 Meg.	‡		BTS-2.2 Meg.	Red-Red-Grn. Driver Grid
100	3Ω	1		BW-1-3.3	Or.-Blk.-Blk. Fil. Dropping
101	470Ω	2		BW-2-470	Yl.-Vi.-Br. Output Cathode
102	470Ω	2		BW-2-470	Yl.-Vi.-Br. " "
103A	200Ω	10	RW3-2	AB-200	Filter
B	800Ω	10		AB-800	"
104A	200Ω	10	RW3-2	AB-200	"
B	800Ω	10		AB-800	"
132	1000Ω	½		BTS-1000	Br.-Blk.-Red Decoupling

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	PHILLIPS 66 PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
105	117V AC @ 1.07A	700V CT .145A DC	4.8V AC @ 3.0A	6.2V AC @ 4.3A	TP-10	P-4081§	T-22R33‡	P-3155§

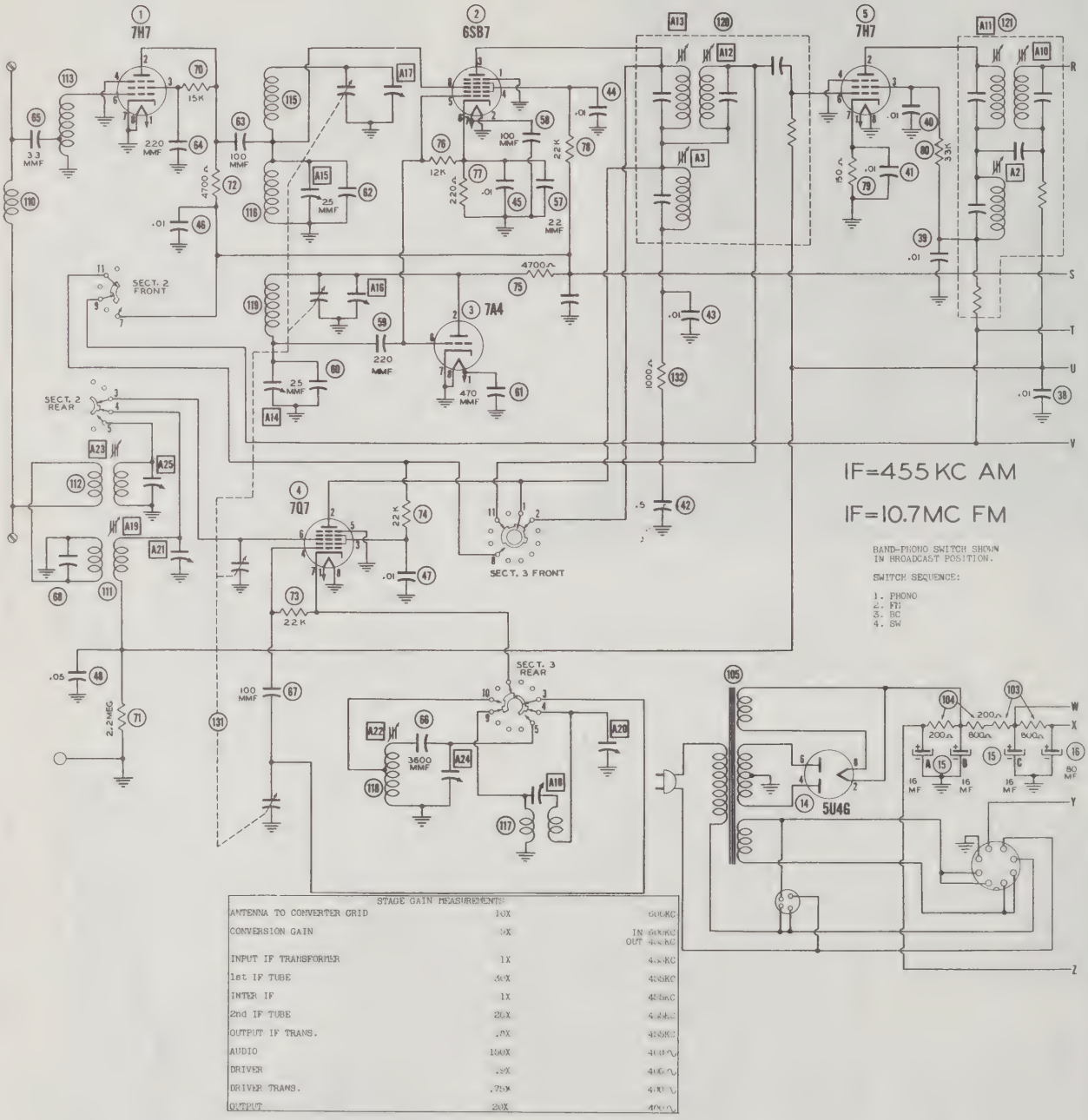
‡Drill new mounting holes.
§Add series resistor to reduce plate voltage.



DISASSEMBLY INSTRUCTIONS

1. Remove four push-on type control knobs.
2. Remove power supply, audio amp. and phono-motor plugs from power supply chassis.
3. Remove speaker plug from speaker.
4. Remove four screws from under power supply chassis mounting board and remove power supply chassis from cabinet.
5. Remove FM antenna leads from antenna terminal strip.
6. Remove two Phillips head wood screws holding FM antenna terminal strip to cabinet.
7. Remove phono-pickup plug from tuning chassis.
8. Remove four screws from under tuning chassis mounting board. Remove tuning chassis from cabinet.
9. Remove four hex nuts holding speaker in cabinet. Remove speaker from cabinet.

10/48-#4218-20 SET #49-FOLDER #20



STAGE GAIN MEASUREMENTS

ANTENNA TO CONVERTER GRID	10X	600KC
CONVERSION GAIN	9X	IN 600KC OUT 455KC
INPUT IF TRANSFORMER	1X	455KC
1st IF TUBE	50X	455KC
INTER IF	1X	455KC
2nd IF TUBE	20X	455KC
OUTPUT IF TRANS.	.7X	455KC
AUDIO	100X	400~
DRIVER	.5X	400~
DRIVER TRANS.	.75X	400~
OUTPUT	20X	400~

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

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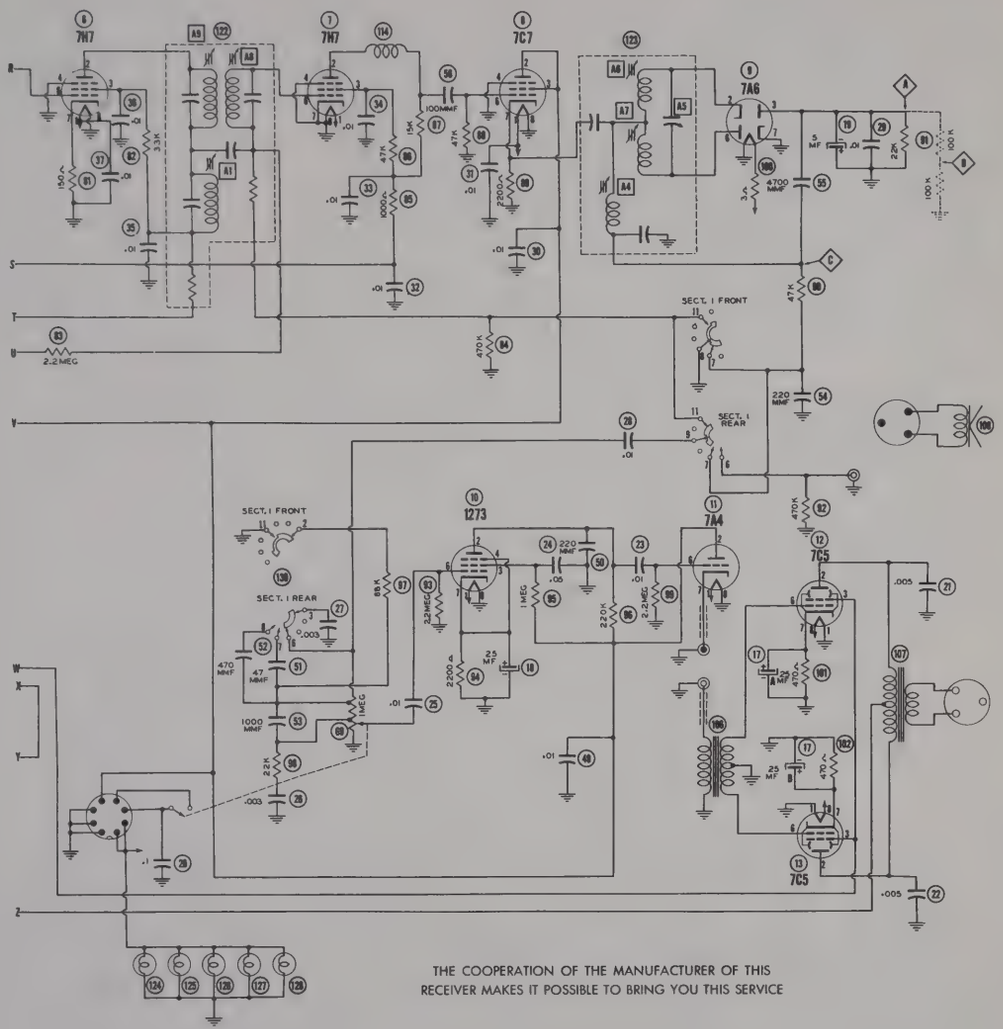

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

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4818-20

VOLTAGE READINGS

	Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
‡	1	7H7	6.2VAC	150VDC	95VDC	0V.	0V.	0V.	0V.	0V.
‡	2	6SB7Y	0V.	0V.	225VDC	95VDC	-9VDC§	2VDC	6.2VAC	0V.
‡	3	7A4	6.2VAC	140VDC	0V.	0V.	0V.	-9VDC§	0V.	0V.
	4	7Q7	6.2VAC	295VDC	110VDC	-11VDC§	0V.	-.2VDC	0V.	0V.
	5	7H7	6.2VAC	260VDC	150VDC	0V.	0V.	0V.	1.1VDC	0V.
	6	7H7	6.2VAC	280VDC	145VDC	0V.	0V.	0V.	1VDC	0V.
	7A	7H7	6.2VAC	-.5VDC	-.5VDC	0V.	0V.	0V.	-.4VDC	0V.	0V.
‡	7B	7H7	6.2VAC	130VDC	77VDC	0V.	0V.	0V.	-.2VDC	0V.	0V.
‡	8	7C7	6.2VAC	235VDC	235VDC	0V.	0V.	0V.	20VDC	0V.
‡	9	7A6	6.2VAC	.1VDC	-.1VDC	0V.	0V.	.1VDC	0V.	2.8VAC
	10	1273	6.2VAC	112VDC	65VDC	2.6VDC	0V.	0V.	2.6VDC	0V.
	11	7A4	6.2VAC	300VDC	300VDC	300VDC	0V.	0V.	10VDC	0V.
	12	7C5	0V.	360VDC	330VDC	0V.	0V.	0V.	19VDC	6.2VAC
	13	7C5	0V.	360VDC	330VDC	0V.	0V.	0V.	19VDC	6.2VAC
	14	5U4G	0V.	390VDC	0V.	350VAC	0V.	350VAC	0V.	390VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

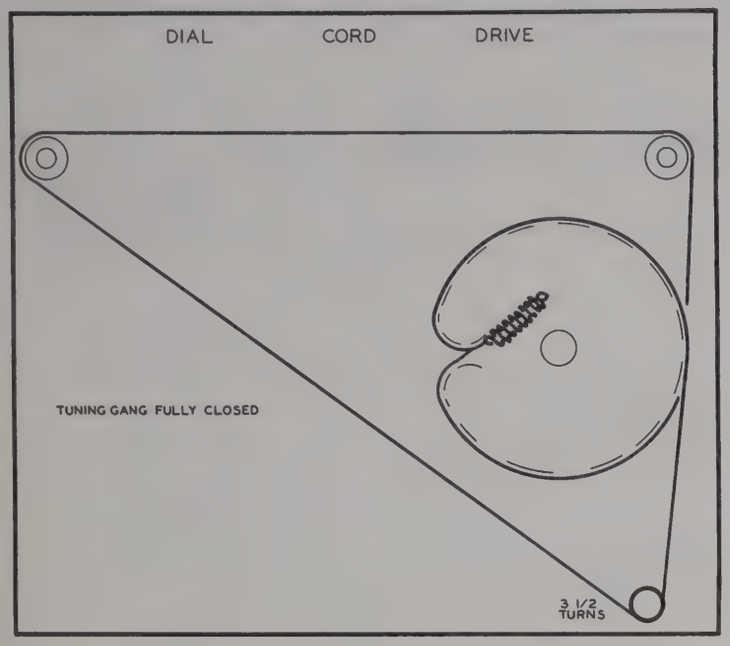
	Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
‡	1	7H7	.05Ω	55KΩ	70KΩ	0Ω	0Ω	0Ω	0Ω	0Ω
‡	2	6SB7Y	0Ω	0Ω	52KΩ	72KΩ	12KΩ	220Ω	.05Ω	0Ω
‡	3	7A4	.05Ω	55KΩ	INF.	INF.	INF.	12KΩ	0Ω	0Ω
	4	7Q7	.05Ω	52KΩ	72KΩ	22KΩ	0Ω	1.2 Meg.	.2Ω	0Ω
	5	7H7	.05Ω	55KΩ	85KΩ	0Ω	0Ω	1.5 Meg.	150Ω	0Ω
	6	7H7	.05Ω	55KΩ	85KΩ	0Ω	0Ω	1.5 Meg.	150Ω	0Ω
	7A	7H7	.05Ω	INF.	INF.	0Ω	0Ω	590KΩ	0Ω	0Ω
‡	7B	7H7	.05Ω	68KΩ	100KΩ	0Ω	0Ω	120KΩ	0Ω	0Ω
‡	8	7C7	.05Ω	52KΩ	52KΩ	0Ω	0Ω	47KΩ	2.2KΩ	0Ω
‡	9	7A6	.05Ω	INF.	22KΩ	INF.	0Ω	INF.	0Ω	7.5Ω
	10	1273	.05Ω	270KΩ	1 Meg.	2.2KΩ	0Ω	2.2 Meg.	2.2KΩ	0Ω
	1	7A4	.05Ω	52KΩ	52KΩ	52KΩ	0Ω	2.2 Meg.	1.1KΩ	0Ω
	2	7C5	0Ω	50KΩ	50KΩ	INF.	INF.	250Ω	470Ω	.05Ω
	3	7C5	0Ω	50KΩ	50KΩ	INF.	INF.	300Ω	470Ω	.05Ω
	4	5U4G	INF.	50KΩ	INF.	60Ω	INF.	58Ω	INF.	50KΩ

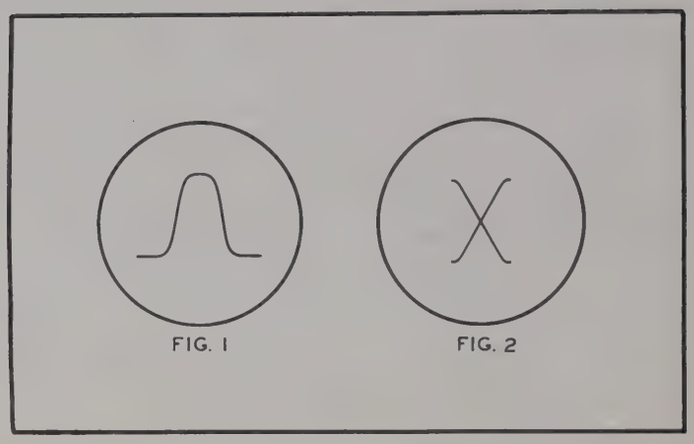
RADIO-PHONO SWITCH IN RADIO POSITION.

‡ VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.





10/48-44818-20 SET #48-FOLDER #20

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer 3-1/8" from left edge of dial backplate. This is the calibration mark referred to below.
Use insulated alignment screwdriver for all adjustments.

AM IF ALIGNMENT

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.01 MFD	High side to rear AM stator of tuning cap. Low side to chassis.	455KC	BC (2 positions clockwise)	Tuning cap. fully open.	Across voice coil	A1,A2, A3,	Adjust for maximum output

FM ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

If a VTVM is not available a 20KΩ per volt DC voltmeter may be used as an output indicator.
In Step 3 connect 2-100KΩ resistors in series from Point A to chassis. The values of these two resistors must be within 1% of each other. The junction of these two resistors is Point B. (See schematic).

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
2	.01 MFD	High side to Pin 6 (grid) of 7H7 3rd IF Tube (7). Low side to chassis.	10.7MC (unmodulated)	FM (1 position clockwise)	Tuning cap. fully open.	DC probe to Point A. Common to chassis	A4	Adjust for maximum deflection.
3	.01 MFD	"	"	"	"	DC probe to Point B. Common to Point A. (See prealignment notes)	A5	Adjust for zero deflection.
4	.01 MFD	"	10.4MC (Unmodulated)	"	"	DC probe to Point A. Common to Chassis	A6	Adjust for maximum deflection.
5	.01 MFD	"	11.0MC (unmodulated)	"	"	"	A7	Adjust for maximum deflection. Repeat Steps 3, 4 & 5 until no further improvement can be made making Step 3 last adjustment. Disconnect 2-100KΩ resistors.
6	.01 MFD	High side to Pin 6 (grid) of 7H7 2nd IF Tube (6). Low side to chassis.	10.7MC (Unmodulated)	"	"	"	A8,A9	Adjust for maximum deflection.
7	.01 MFD	High side to Pin 6 (grid) of 7H7 1st IF Tube (5). Low side to chassis.	"	"	"	"	A10, A11	"
8	.01 MFD.	High side to Pin 8 (grid) of 6SB7Y. Low side to chassis.	"	"	"	"	A12, A13	"
9	300Ω carbon res.	High side to terminal "A" on ant. terminal strip. Low side to terminal "D".	92MC	"	1-3/4" from calibration mark.	"	A14, A15	"
10	"	"	106MC	"	5-11/16" from calibration mark.	"	A16, A17	Adjust for maximum deflection. Repeat Steps 9 & 10 until no further improvement can be made. Continue with AM-RF Alignment.

FM ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use freq. modulated signal with 60∿ modulation and 450KC sweep except in Step 5 where 225KC sweep is used.
Use 120∿ sawtooth voltage in scope for horizontal deflection.

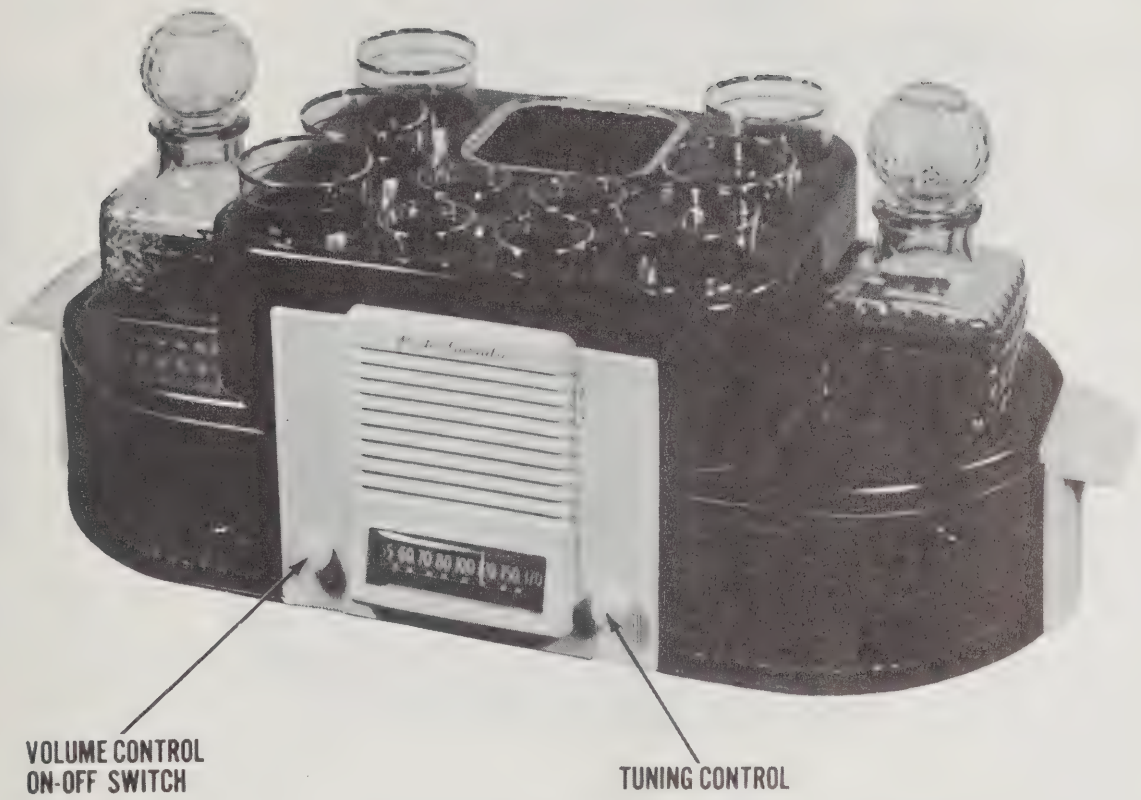
	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
2	.01 MFD	High side to Pin 6 (grid) of 7H7 2nd IF Tube(6). Low side to chassis.	10.7MC (Freq. Modulated)	FM	Tuning cap. fully open.	Vertical input to Point D. Ground to chassis.	A4,A8, A9	Disconnect 5 MFD cap. from Point A. Adjust A4, A8,& A9 for maximum amplitude, symmetry and coincidence of pattern per Fig. 1.
3	.01 MFD	High side to Pin 6 (grid) of 7H7 1st IF Tube (5). Low side to chassis.	"	"	"	"	A10, A11	Adjust for maximum amplitude, symmetry & coincidence of pattern per Fig. 1.
4	.01 MFD	Unsolder lead from Pin 8 of 6SB7Y. Connect 100KΩ resistor from Pin 8 to chassis making leads as short as possible. High side signal gen. to Pin 8. Low side to chassis.	"	"	"	"	A12, A13	"
5	.01 MFD	"	10.7MC (Freq. Modulated 225KC sweep)	"	"	Vertical input to Point D. Ground to chassis.	A5,A6, A7	Reconnect 5 MFD cap. to Point A. Alternately adjust A6 & A7 for peaks occurring about 200KC either side of center of pattern and A5 for maximum straightness of crossover lines with crossover occurring at center of pattern per Fig. 2. Remove 100KΩ resistor from Pin 8 of 6SB7Y and reconnect lead to Pin 8.
6	300Ω carbon res.	High side to terminal "A" of ant. terminal strip. Low side to terminal "D".	92MC (Freq. Modulated)	"	1-3/4" from calibration mark.	Vertical input to Point A. Ground to chassis.	A14, A15	Disconnect 5 MFD cap. from Point A. Alternately adjust A14 for coincidence and A15 for maximum amplitude of pattern per Fig. 1.
7	"	"	106MC (Freq. Modulated)	"	5-11/16" from calibration mark.	"	A16, A17	Alternately adjust A16 for coincidence and A17 for maximum amplitude of pattern per Fig. 1. Repeat Steps 6 & 7 until no further improvement can be made. Reconnect 5 MFD cap. to Point A and continue with AM RF Alignment.

AM RF ALIGNMENT

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
11	200MMFD	High side to terminal "D" on ant. terminal strip. Low side to chassis.	600KC	BC	2-1/4" from calibration mark.	Across voice coil	A18, A19	Adjust for maximum output
12	200MMFD	"	1550KC	"	6-1/4" from calibration mark.	"	A20, A21	Adjust for maximum output Repeat Steps 11 & 12 until no further improvement can be made.
13	400Ω carbon res.	"	6MC	SW (fully clockwise)	13/16" from calibration mark.	"	A22, A23	Adjust for maximum output
14	"	"	18MC	"	6-27/32" from calibration mark.	"	A24, A25	Adjust for maximum output Repeat Steps 13 & 14 until no further improvement can be made.

PORTO BARADIO MODELS
PA-510, PB-520 (REVISED)



PORTO BARADIO MODELS
PA-510, PB-520 (REVISED)

PORTO BARADIO MODEL PB-520

TRADE NAME	PORTO BARADIO, Models PA-510, PB-520 (Revised)
SUPPLIER	Porto Products, 412 N. Orleans St., Chicago, Ill.
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types 12SA7GT Converter, 12SK7GT IF Amp., 12SQ7GT Det.-AVC-AF, 50L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	110-120 Volts AC-DC
TUNING RANGE—BROADCAST	540-1670KC RATING .23 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low frequency end of dial.

Use isolation transformer if available. If not, connect a .1 MFD capacitor in series with low side of signal generator and chassis.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1MFD	High side to rear stator of tuning cap. Low side to chassis.	455KC	Tuning cap. fully open.	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD. to reduce hum modulation.
2		Loop	1400KC	1400KC	Across voice coil	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		Loop	1400KC	Tune for maximum output.	Across voice coil	A6	Adjust for maximum output.

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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DATE 10/48-#4818-21 SET #48-FOLDER #21

PARTS LIST AND DESCRIPTIONS

PORTO BARADIO
MODEL PB-520

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: PORTO BARADIO PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	12SA7GT	12SA7GT	8AD	
2	IF Amp.	12SK7GT	12SK7GT	8N	
3	Det.-AVC-AF	12SQ7GT	12SQ7GT	8Q	
4	Power Output	50L6GT	50L6GT	7AC	
5	Rectifier	35Z5GT	35Z5GT	6AP	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: PORTO BARADIO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	40	150	3-3	PRSA150-40-20	EDL4215	DSB-2x30-150	TA-240	Filter-Red
B	20	150						Filter-Blue
7	.1	600		684-.1	DT6P1	ST-6-1	TC-1	Line Filter
8	.02	400		484-02	DT4S2	ST-4-02	TC-12	Output Plate Bypass
9	.01	400		484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
10	.01	200		484-01	DT2S1	ST-4-01	TC-11	" "
11	.05	600		684-05	DT6S5	ST-6-05	TC-15	AVC Filter
12	250	500		1468-00025	5W5T25	MO.5-325	1FM-325	AF Plate Bypass
13	270	500		1468-00025	5W5T25	MO.5-325	1FM-325	Diode RF Filter
14	100	500		1468-0001	5W5T1	MO.5-31	1FM-31	Osc. Grid Cap. - Ceramic

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PORTO BARADIO PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
15(A)	500KΩ	½	20-8	D13-133	AM-60-Z	Volume Control
(B)	Shaft		Not Req.	E	KSS-3	Attach to 15A per instructions
(C)	Switch		Not Req.	41	SW-A	" " " " "

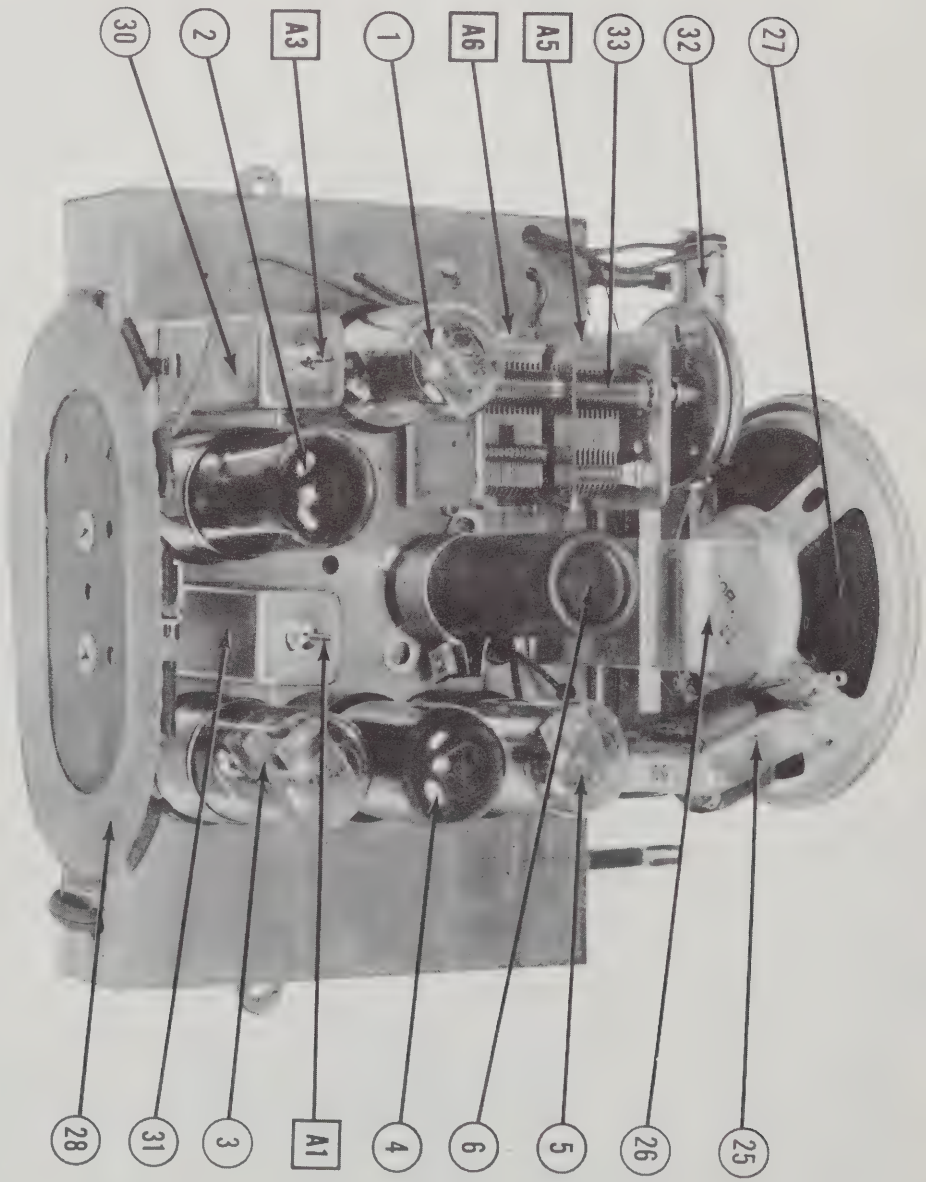
RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PORTO BARADIO PART No.	IRC PART No.	IDENTIFICATION CODES
16	10KΩ	½		BTS-10K	Br.-Blk.-Or. Oscillator Grid
17	10 Meg.	½		BTS-10 Meg.	Br.-Blk.-Blue AVC Network
18	2.2 Meg.	½		BTS-2.2 Meg.	Red-Red-Grn. AVC Network
19	10 Meg.	½		BTS-10 Meg.	Br.-Blk.-Blue AF Grid
20	500KΩ	½		BTS-470K	Grn.-Blk.-Yl. AF Plate Load
21	500KΩ	½		BTS-470K	Grn.-Blk.-Yl. Output Grid
22	150Ω	2		BW-½-150	Br.-Grn.-Br. Output Cathode
23	2000Ω	1		BTA-2200	Red-Blk.-Red Filter
24	10Ω	½		BW-½-10	Br.-Blk.-Blk. Rectifier Ballast

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: PORTO BARADIO PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	INSTALLATION NOTES
25	1700Ω	3.2Ω	307Ω	.4Ω	Part of 8-11	A-3878 †	T22S45†	A-2928†	†Drill one new mounting Bracket.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: PORTO BARADIO PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	VC IMP.		ST-113 #		#Trim flange and fabricate new mounting bracket.
26	PM	3.2Ω	8-11	Mod. P4-X	4A07 #	
	CONE DIA.	VC DIA				
27	4"	9/16"				

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: PORTO BARADIO PART No.	REPLACEMENT DATA: MEISSNER PART No.
28	Loop Ant.		2.3Ω	13-3	
29	Osc. Coil	1Ω	6Ω	14-4	14-1060
30	Input IF	16.5Ω	16.5Ω	15-3	16-6678
31	Output IF	16.5Ω	16.5Ω	15-3	16-6678

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: PORTO BARADIO PART No.	REPLACEMENT DATA	INSTALLATION NOTES
32	Bayonet	6-8V	0.15A	Brown			Type #47

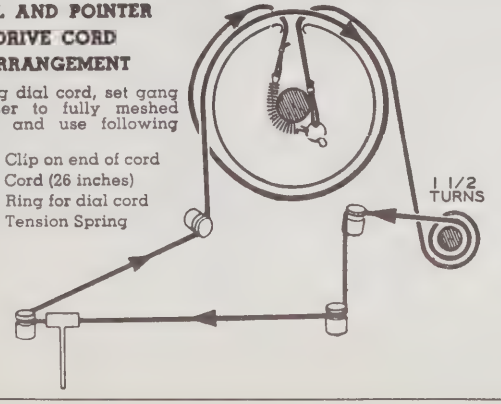
MISCELLANEOUS

ITEM No.	PART NAME	PORTO BARADIO PART No.	NOTES
33	2 Gang Var. Cap	6-6	(19-434MMF. 28-190MMF)
	Dial Scale	7-11	
	Dial Pointer	2-36	
	Knob	36-23	Ivory (PB-520), Gold (PA-510)

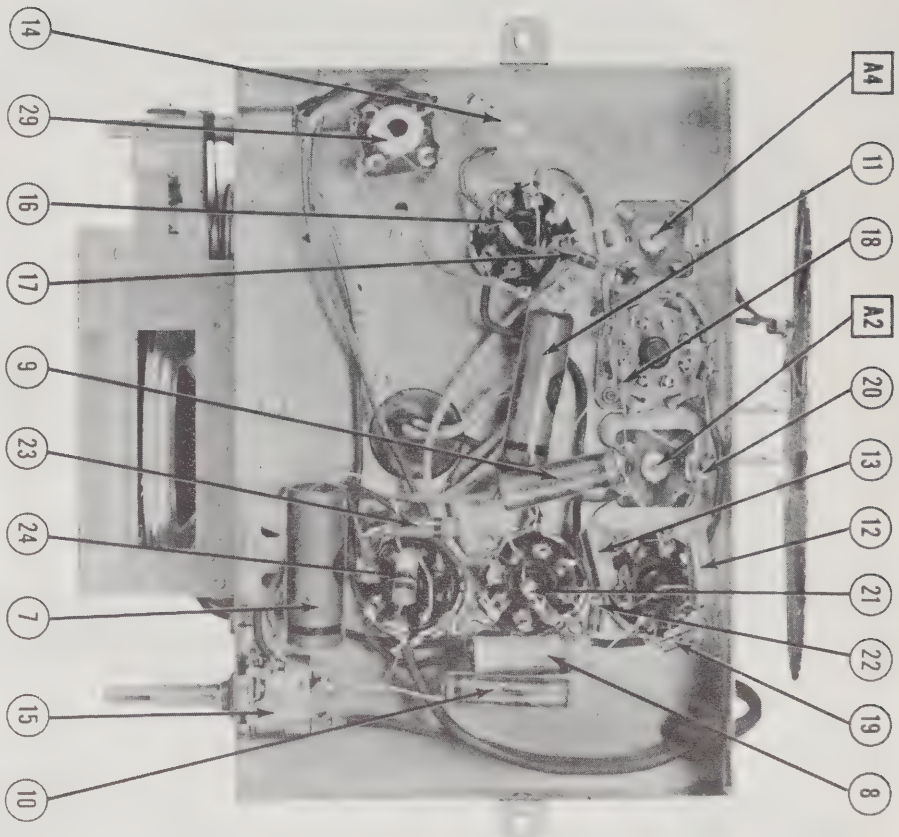
DIAL AND POINTER DRIVE CORD ARRANGEMENT

To string dial cord, set gang condenser to fully meshed position and use following parts:

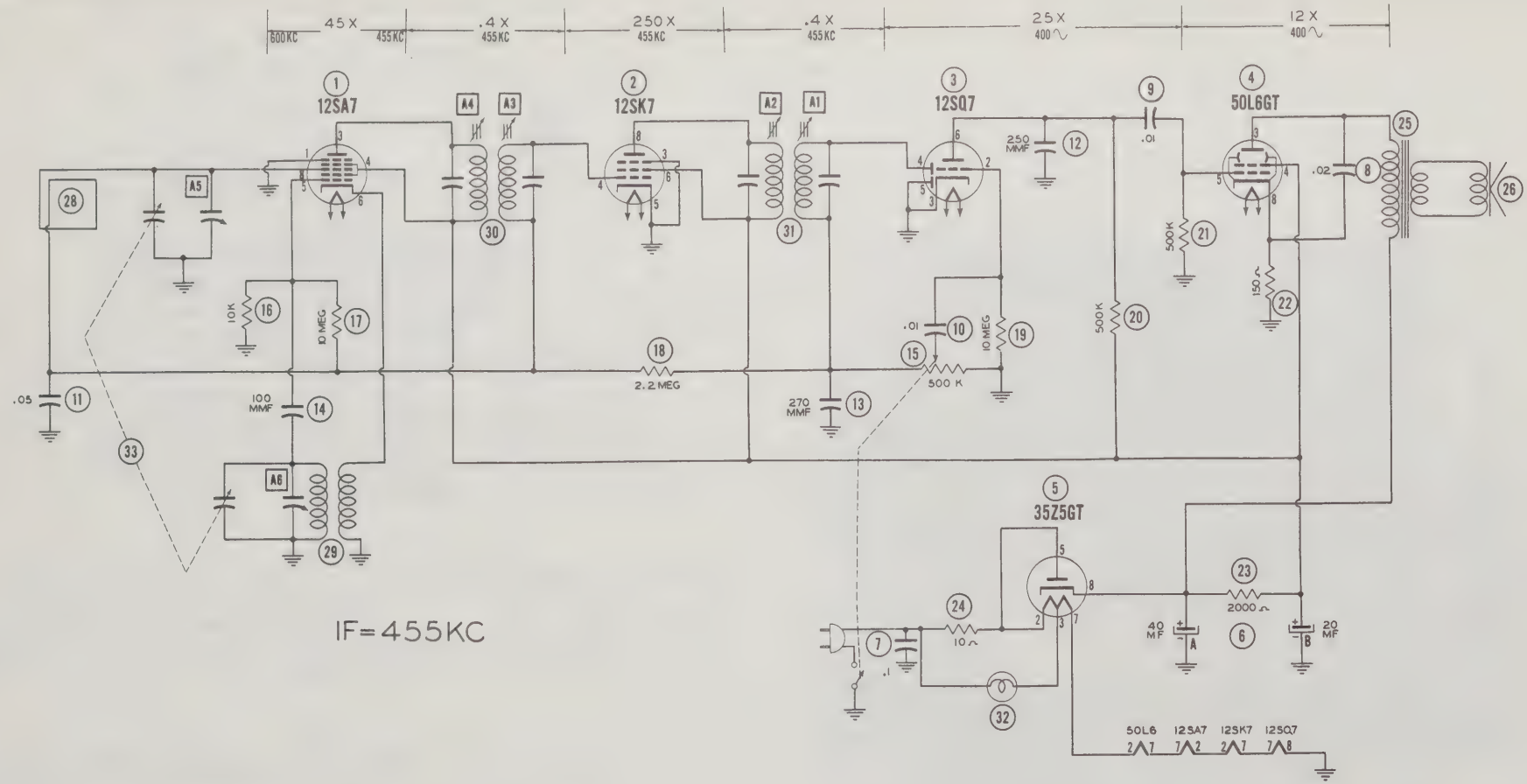
114955 Clip on end of cord
117057 Cord (26 inches)
119087 Ring for dial cord
161284 Tension Spring



CHASSIS—BOTTOM VIEW



PORTO BARADIO MODEL PB-520



IF=455KC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7GT	0V.	24VAC	75VDC	75VDC	-6.6VDC§	0V.	38VAC	-.9VDC
2	12SK7GT	0V.	24VAC	0V.	-.9VDC	0V.	75VDC	12VAC	75VDC
3	12SQ7GT	0V.	-.9VDC	0V.	0V.	-.9VDC	45VDC	12VAC	0V.
4	50L6GT	0V.	90VAC	115VDC	75VDC	0V.	0V.	38VAC	5VDC
5	35Z5GT	0V.	114VAC	110VAC	0V.	114VAC	117VAC	90VAC	125VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7GT	0Ω	26Ω	120KΩ	120KΩ	10KΩ	1Ω	42Ω	2.7 Meg.
2	12SK7GT	0Ω	26Ω	0Ω	2.7 Meg.	0Ω	120KΩ	13Ω	120KΩ
3	12SQ7GT	0Ω	1C Meg.	0Ω	0Ω	50CKΩ	820KΩ	13Ω	0Ω
4	50L6GT	0Ω	95Ω	120KΩ	120KΩ	500KΩ	INF.	42Ω	150Ω
5	35Z5GT	INF.	120Ω	120Ω	INF.	120Ω	125Ω	95Ω	120KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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4818-21

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

SENTINEL MODELS 1U-316PM, 1U-316PT, 316PM, 316PT BATTERY-LINE OPERATED

SENTINEL MODELS 1U-316PM, 1U-316PT, 316PM, 316PT BATTERY-LINE OPERATED

SENTINEL MODEL 316PM

TRADE NAME	Sentinel, Models 316PM, 316PT, 1U-316PM, 1U-316PT
MANUFACTURER	Sentinel Radio Corp., 2100 W. Dempster St., Evanston, Ill.
TYPE SET	Three Power Operated Portable Superheterodyne Receiver with Loop Antenna
TUBES (FOUR)	Types, 1R5 Converter, 1U4 IF Amp., 1U5 Det.-AVC-AF, 3V4 Power Output
POWER SUPPLY RATING	110-120 Volts AC-DC or 4.5 Volts "A" Supply and 67.5 Volts "B" Supply .12 Amp. @ 117 Volts AC or 105 MA @ 4.5 Volts DC and 9 MA @ 67.5 Volts DC
TUNING RANGE--BROADCAST	540-1730KC

ALIGNMENT INSTRUCTIONS--READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to outside edge of first "5" in the "55" calibration mark.

Use battery power when available. If AC power is used, use an isolation transformer when available. If not, connect a .1 MFD capacitor in series with low side of the signal generator and B-.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.2 MFD.	High side to Pin 6 (grid) of 1R5. Low side to chassis.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4	Adjust for maximum output. If AC power is used without an isolation transformer reduce dummy ant. to 200 MMF. to reduce hum modulation.
2	Direct	Solder a 100KΩ carbon resistor across loop terminals. High side of signal gen. to high side of loop. Low side of sig. gen. to low side of loop.	1730KC	"	"	A5	Adjust for maximum output. Remove 100KΩ resistor and install. Receiver in cabinet.
3		Loop	1400KC	Tune for maximum output.	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

HOWARD W. SAMS & CO., INC. Indianapolis Indiana

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DATE 10/48-#4818-22 SET #48-FOLDER #22

PARTS LIST AND DESCRIPTIONS

SENTINEL MODEL 316PM

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: SENTINEL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	1R5	1R5	7AT	
2	1st IF	1U4	1U4	6AR	
3	Det.-AVC-AF	1U5	1U5	6BW	
4	Power Output	3V4	3V4	6BX	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: SENTINEL PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
5A	40	150	25E28	AF106D20A	UP6CJ54	DY-2x40-150	EL351	■ Filter
B	40	150						▲ "
C	100	10				M-100-12		Fil. Bypass
6	.05	400	23E416	484-05	DT4S5	ST-4-05	TC-15	Line Filter
7	.2	400	23E421	484-.2	DT4P2	ST-4-2	72-P-3	Line Isolation-See Note
8	.005	600	23E408	684-005	DT6D5	ST-6-005	TC-25	Output Plate Bypass
9	.2	200	23E220	484-.2	DT4P2	ST-2-25	TC-2	Fil. Bypass
10	.2	200	23E220	484-.2	DT4P2	ST-2-25	TC-2	" "
11	.05	400	23E416	484-05	DT4S5	ST-4-05	TC-15	AVC Filter
12	.01	400	23E211	484-01	DT4S1	ST-4-01	TC-11	Conv. Screen Bypass
13A	5000	300	*	484-005	DT6D5	ST-6-005	TC-25	Audio Coupling-Cer.
B	100	300		1468-0001	5W5T1	MO.5-31	1FM-31	AF Plate Bypass
C	1000	300		484-005	DT6D5	ST-6-005	TC-25	AF Screen Bypass
D	2000	300		484-002	DT6D2	ST-6-002	TC-22	Audio Coupling
14	100	30	24E24	1468-0001	5W5T1	MO.5-31	1FM-31	Diode RF Filter-Cer.
15	100	30	24E24	1468-0001	5W5T1	MO.5-31	1FM-31	Osc. Grid Cap.-Cer.

Note-Used in Underwriters approved models only.
* -Items 13A, B, C & D are combined into one unit and may be obtained under manufacturers part #23E208A.

CONTROLS

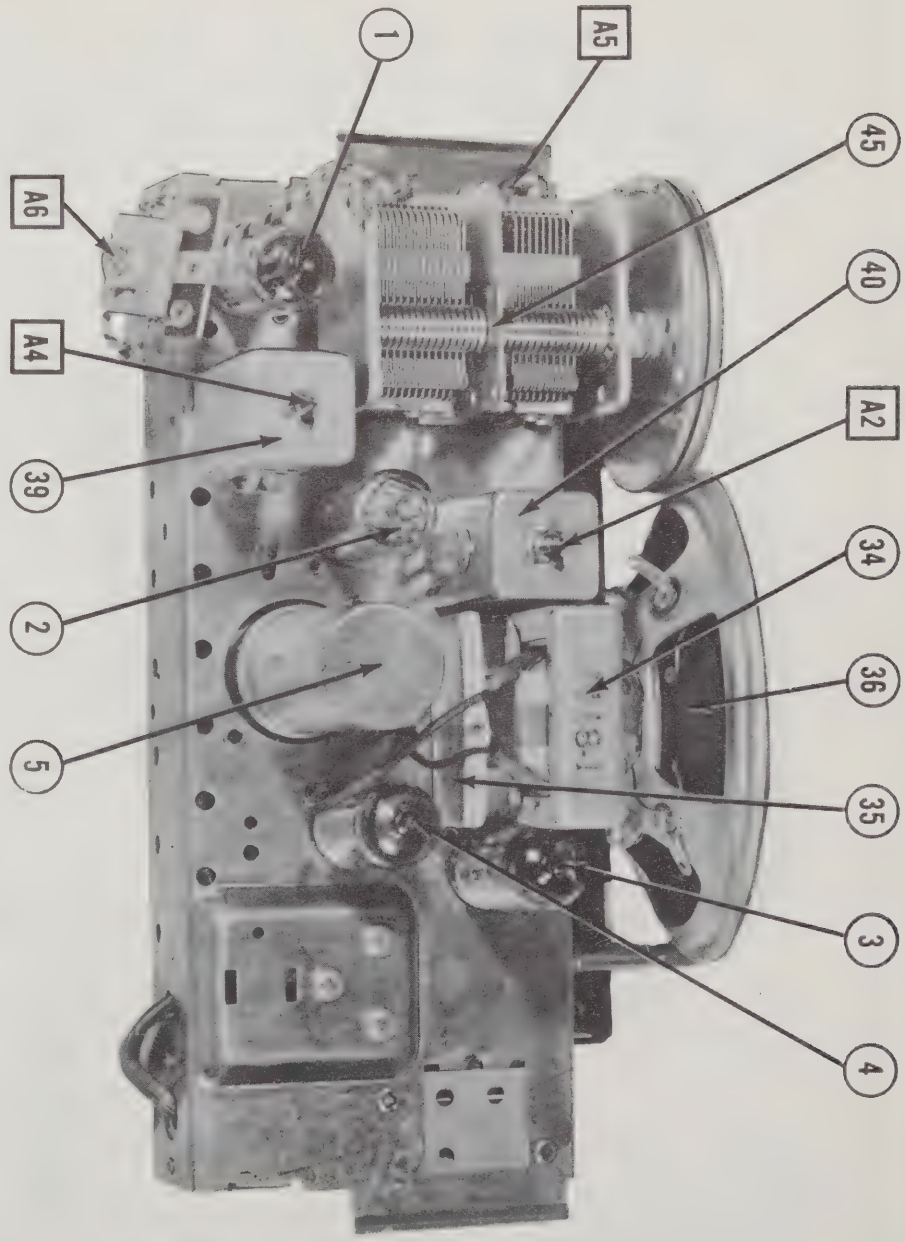
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SENTINEL PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
16	2 Meg.	½	28E30			Volume Control & Sw.

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SENTINEL PART No.	IRC PART No.	IDENTIFICATION CODES
17	68KΩ	½	27E683	BTS-68K	Blue-Gray-Or. Osc. Grid
18	6800Ω	½	27E682	BTS-6800	Blue-Gray-Red Conv. Screen
19	470Ω	½	27E471	BTS-470	Yl.-Vi.-Br. Fil. String
20	470KΩ	½	27E474	BTS-470K	Yl.-Vi.-Yl. Bias Network
21	100KΩ	½	27E104	BTS-100K	Br.-Blk.-Yl. " "
22	4.7 Meg.	½	27E475	BTS-4.7 Meg.	Yl.-Vi.-Grn. AVC Network
23	4.7 Meg.	½	27E475	BTS-4.7 Meg.	Yl.-Vi.-Grn. " "
24	270Ω	½	27E271	BW-½-270	Red-Vi.-Br. Fil. String
25	330Ω	½	27E331	BW-½-330	Or.-Or.-Br. " "
26	4.7 Meg.	½	27E475	BTS-4.7 Meg.	Yl.-Vi.-Grn. AF Grid
27	4.7 Meg.	½	27E475	BTS-4.7 Meg.	Yl.-Vi.-Grn. AF Screen
28	1 Meg.	½	27E105	BTS-1 Meg.	Br.-Blk.-Grn. AF Plate Load
29	2.2 Meg.	½	27E225	BTS-2.2 Meg.	Red-Red-Grn. Output Grid
30	33Ω	½	27E330-2	BW-½-33	Or.-Or.-Blk. Fil. String
31A	1810Ω	8	27E1005	ABA-2000	Fil. Dropping-See Note 2
B	610Ω	½		ABA-750	Filter-See Note 3
32	68Ω	1	27E68-3	BW-1-68	Blue-Gray-Blk. Surge Limiter
33	220KΩ	½	27E224	BTS-220K	Red-Red-Yl. Line Isolation-See Note 1

Note 1-Used only on Underwriters approved Models.
Note 2-On IRC replacement set slider 1810Ω from end.
Note 3-On IRC replacement set slider 610Ωfrom end.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		SENTINEL PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
34	6000Ω	3.4Ω	430Ω	.4Ω	Part of 1H29	A-3848#	T22S47#	A-2900#	#Bend mounting tabs down file out slots and mount on original brackets.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			SENTINEL PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.		ST-113‡		‡Drill and tap magnet frame.
35	PM	3.4Ω	1E29	Mod. P4-X	4A15‡	
	CONE DIA.	VC DIA.				
36	4"	9/16"				

R F COILS

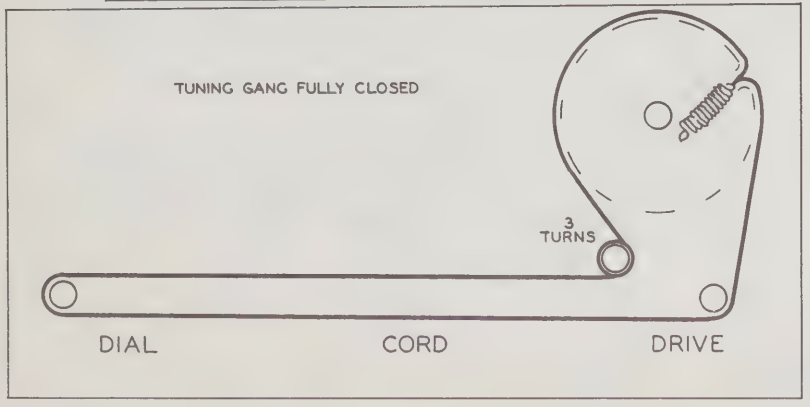
ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PRI.	SEC.	SENTINEL PART No.	MEISSNER PART No.
37	Loop Ant.		1.5Ω	64E18	
38	Osc. Coil	2Ω	6Ω	20L338	
39	Input IF	27Ω	27Ω	20E337	16-6678
40	Output IF	27Ω	27Ω	20E337	16-6678

BATTERIES

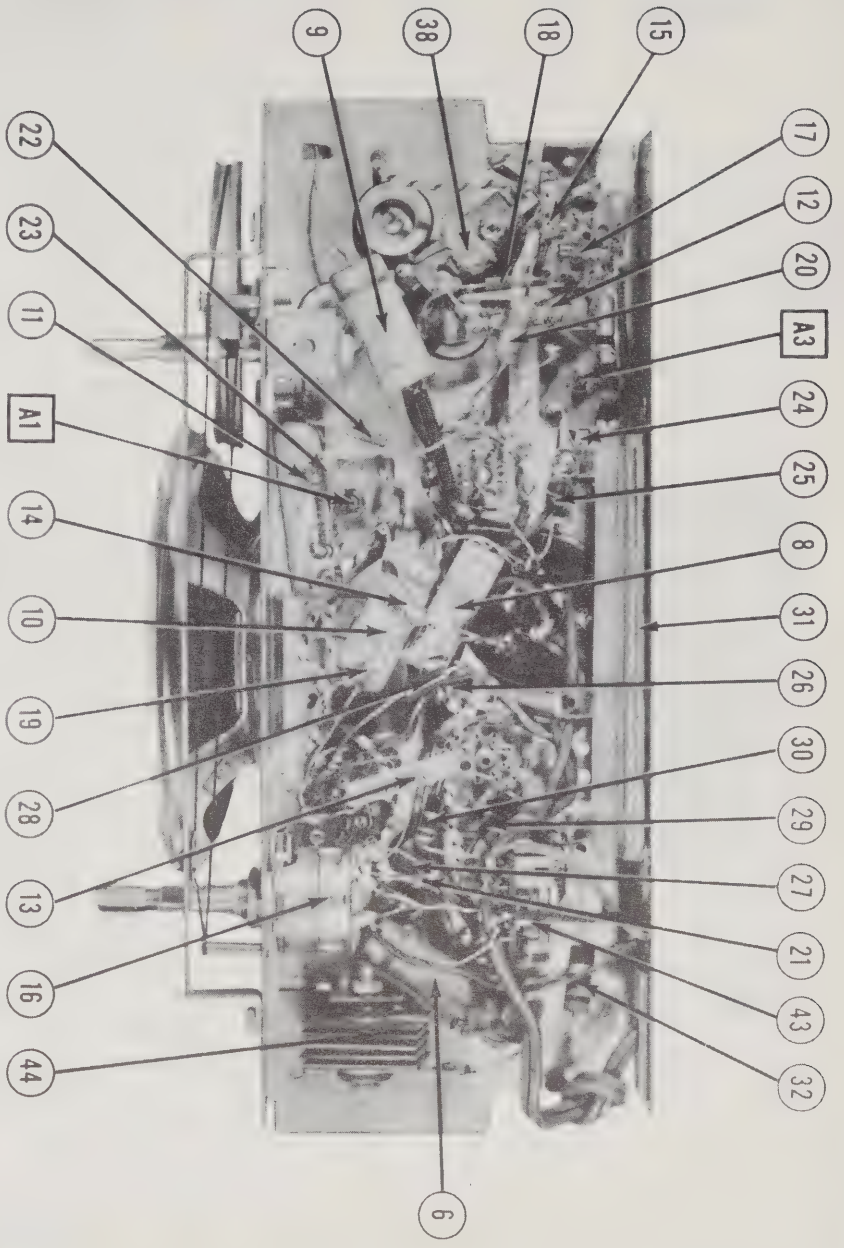
ITEM No.	VOLTAGE	SENTINEL PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
41	4.5V "A"	A38	746			G3			
42	67.5V "B"	B7634		467			XX45		

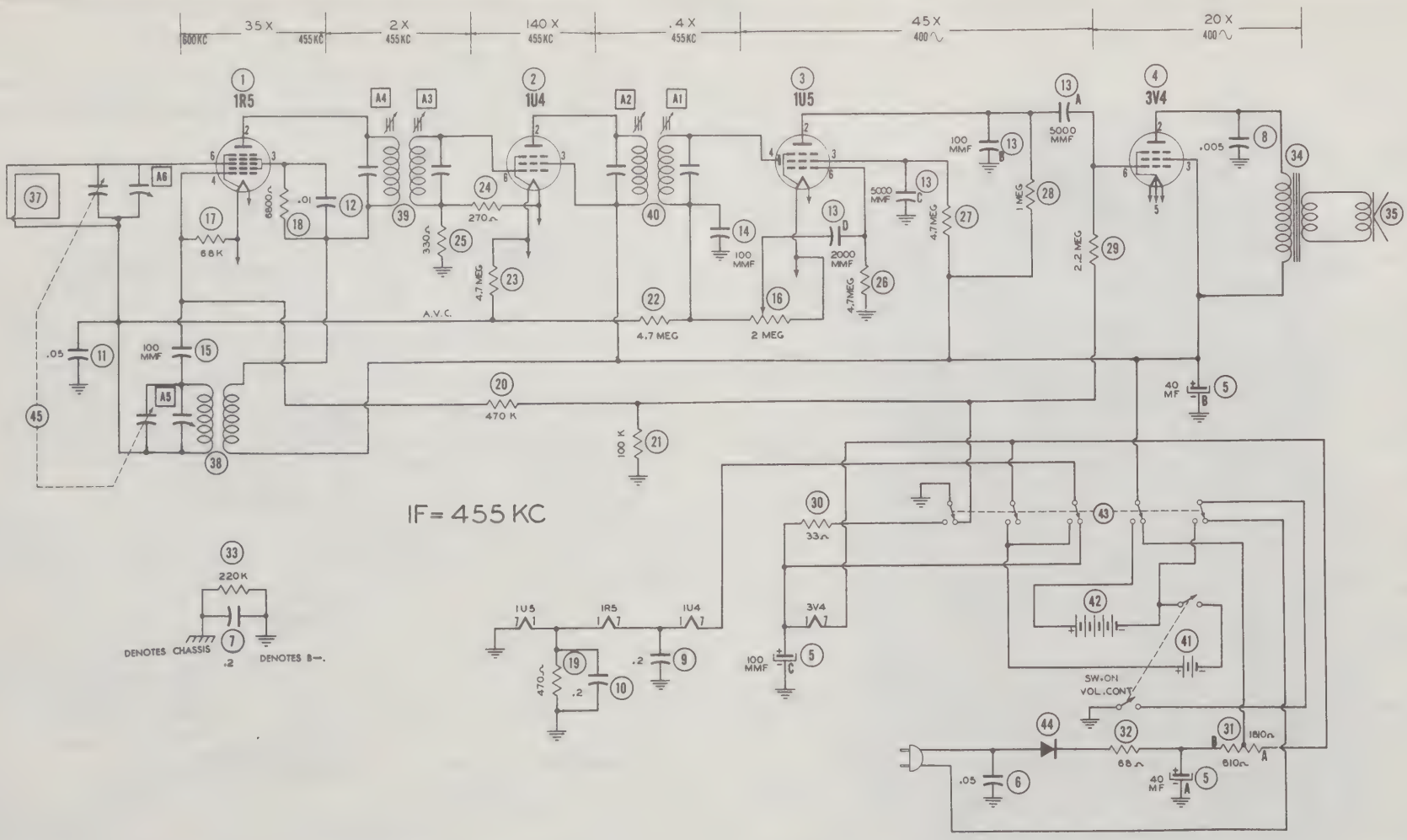
MISCELLANEOUS

ITEM No.	PART NAME	SENTINEL PART No.	NOTES
43	Switch	29E20	AC/DC Batt.
44	Rectifier	57E1-4	Selenium
45	2 Gang Var. Cap.	20E339	(26-452MMF, 22-185MMF)
A6	Trimmer	24E33	Ant. Adj.
	Cabinet	20E343	Complete (Specify Color)
	Dial Pointer	35E8-8	
	Knob	37E17-5	(Specify Color)



CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

VOLTAGE AND RESISTANCE READINGS TAKEN IN AC-DC POSITION.

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	1.4VDC	85VDC	80VDC	-17VDC§	1.4VDC	.2VDC	2.8VDC
2	1U4	2.8VDC	85VDC	85VDC	0V.	2.8VDC	2.2VDC	4.2VDC
3	1U5	1.4VDC	35VDC	15VDC	15VDC	0V.	-.1VDC	0V.
4	3V4	4.2VDC	77VDC	85VDC	0V.	5.6VDC	0V.	77VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	*	1.7KΩ	6.5KΩ	65KΩ	*	2.5 Meg.	*
2	1U4	*	1.7KΩ	1.7KΩ	0Ω	*	330Ω	*
3	1U5	*	1 Meg.	4.7 Meg.	1.3 Meg.	INF.	5 Meg.	0Ω
4	3V4	*	2KΩ	1.7KΩ	INF.	*	2.2 Meg.	*

*DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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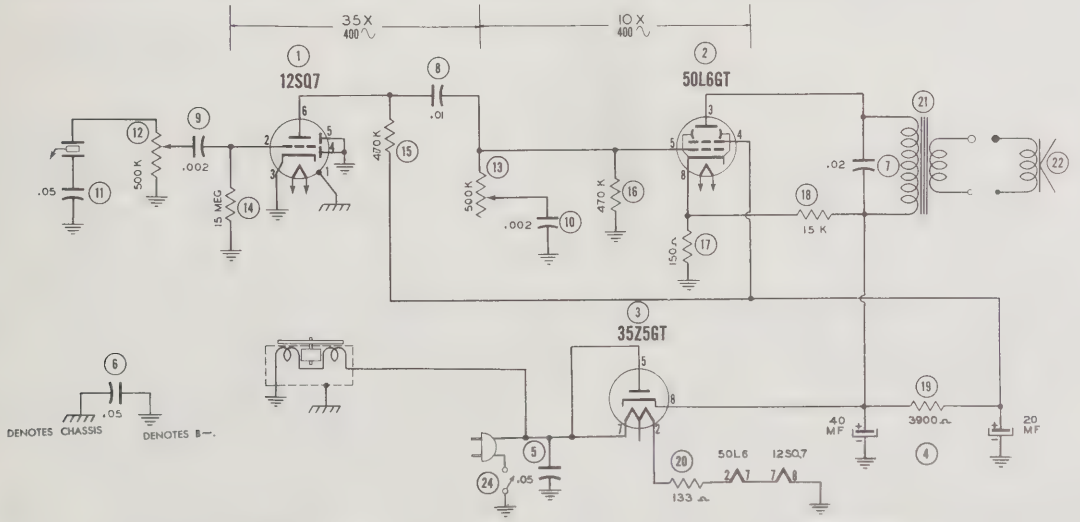
4818-22

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by shorting across volume control.

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by connecting negative (-) 3 volts to the AVC line.

SILVERTONE MODEL 8149

TRADE NAME	Silvertone, Model 8149 (Ch. 109.633)
SUPPLIER	Sears Roebuck & Co., 925 S. Homan St., Chicago, Ill.
TYPE SET	AC Operated Phono Player with 3 Tube Amplifier
TUBES (THREE)	Types, 12SQ7GT AF Amp., 50L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	110-120 Volts AC RATING .23 Amp. @ 117 Volts AC



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SQ7GT	0V.	-.8VDC	0V.	0V.	0V.	60VDC	11VAC	0V.
2	50L6GT	0V.	60VAC	120VDC	115VDC	0V.	0V.	11VAC	8VDC
3	35Z5GT	0V.	75VAC	85VDC	60VAC	117VAC	115VDC	117VAC	130VDC

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SQ7GT	INF.	15 Meg.	0Ω	0Ω	0Ω	490KΩ	14Ω	0Ω
2	50L6GT	0Ω	65Ω	15KΩ	20KΩ	470KΩ	INF.	14Ω	[illegible]
3	35Z5GT	0Ω	190Ω	200Ω	65Ω	225Ω	20KΩ	225Ω	[illegible]

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

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4818-23

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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SILVERTONE MODEL
8149 (Ch. 109.633)

SILVERTONE MODEL
8149 (Ch. 109.633)

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: SILVERTONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	AF Amp.	[illegible]	[illegible]	[illegible]	
2	Power Output	[illegible]	[illegible]	[illegible]	
3	Rectifier	[illegible]	5Z3GT	5AS	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: SILVERTONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
4A	[illegible]	[illegible]	A-8948	AF4-4D*	UP4215	DY-4020-150	EL-24	Filter
4b	[illegible]	[illegible]						"
5	.05	400		484-05	DT4S5	ST-4-05	TC-15	Line Filter
6	.05	400		484-05	DT4S5	ST-4-05	TC-15	Line Isolation
7	.05	400		484-05	DT4S2	ST-4-02	TC-15	Output Plate Bypass
8	.01	400		484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
9	.002	600		684-002	DT6D2	ST-6-002	TC-22	" "
10	.002	600		684-002	DT6D2	ST-6-002	TC-22	Tone Compensation
11	.05	400		484-05	DT4S5	ST-4-05	TC-15	Phono Isolation

*Parallel sections to obtain desired capacity.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SILVERTONE PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
12A	500KΩ	½	B-54466-3	D13-133	AM-60-Z	Volume Control
12B	Shaft		Not Req.	E	KSS-3	Attach to 12A per instructions
13A	500KΩ	½	B-54466-3	D13-133	AM-60-Z	Tone Control
13b	Shaft		Not Req.	E	KSS-3	Attach to 13A per instructions

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SILVERTONE PART No.	IRC PART No.	IDENTIFICATION CODES
14	15 Meg.	1/3		BTS-15 Meg.	Br.-Grn.-Blue AF Grid
15	470KΩ	1/3		BTS-470K	Yl.-Vi.-Yl. AF Plate Load
16	470KΩ	1/3		BTS-470K	Yl.-Vi.-Yl. Output Grid
17	150Ω	1		BW-1-150	Br.-Grn.-Br. Output Cathode
18	15KΩ	1		BTA-15K	Br.-Grn.-Or. Output Cathode Bias
19	3900Ω	2		BTS-3900	Or.-White-Red Filter
20	133Ω	5	A-8523	ABA-150	Line Dropping-See Note

Note - On IRC replacement set slider at 133Ω from one end.

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: SILVERTONE PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	INSTALLATION NOTES
21	[illegible]	3.3Ω	270Ω	.7Ω	C-8157-2	A-3878	T22S46	A-2823	

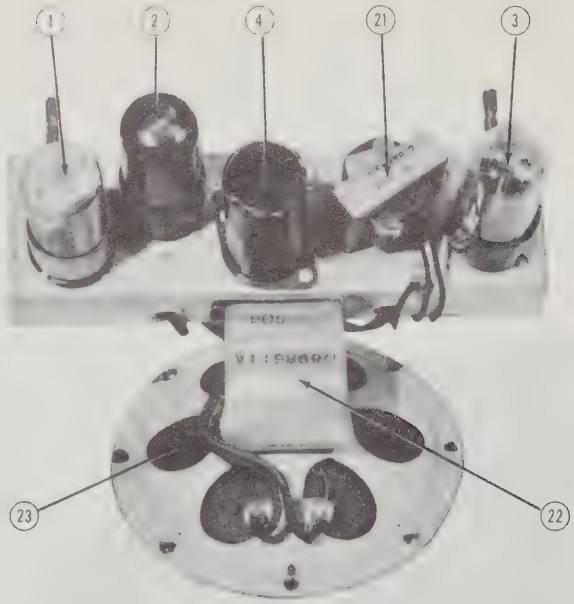
SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: SILVERTONE PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
22	FIELD RES. / IM	VC IMP. / 3.3Ω	D-8881-1	ST-107 Mod. P8-V	5A1	
23	CONE DIA. / 4-3/4"	VC DIA. / 9/16"				

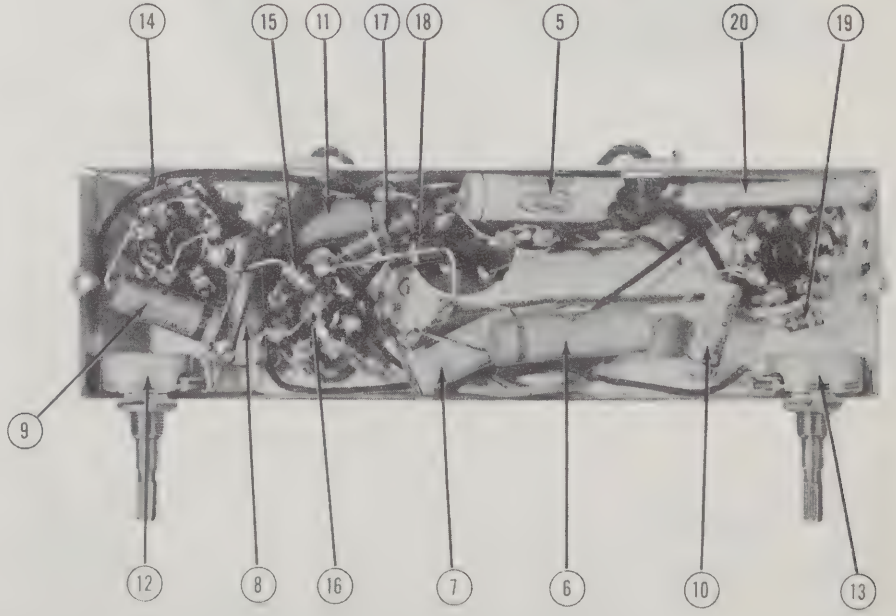
MISCELLANEOUS

ITEM No.	PART NAME	SILVERTONE PART No.	NOTES
24	Switch	[illegible]	Power
	[illegible]	[illegible]	Volume or Tone

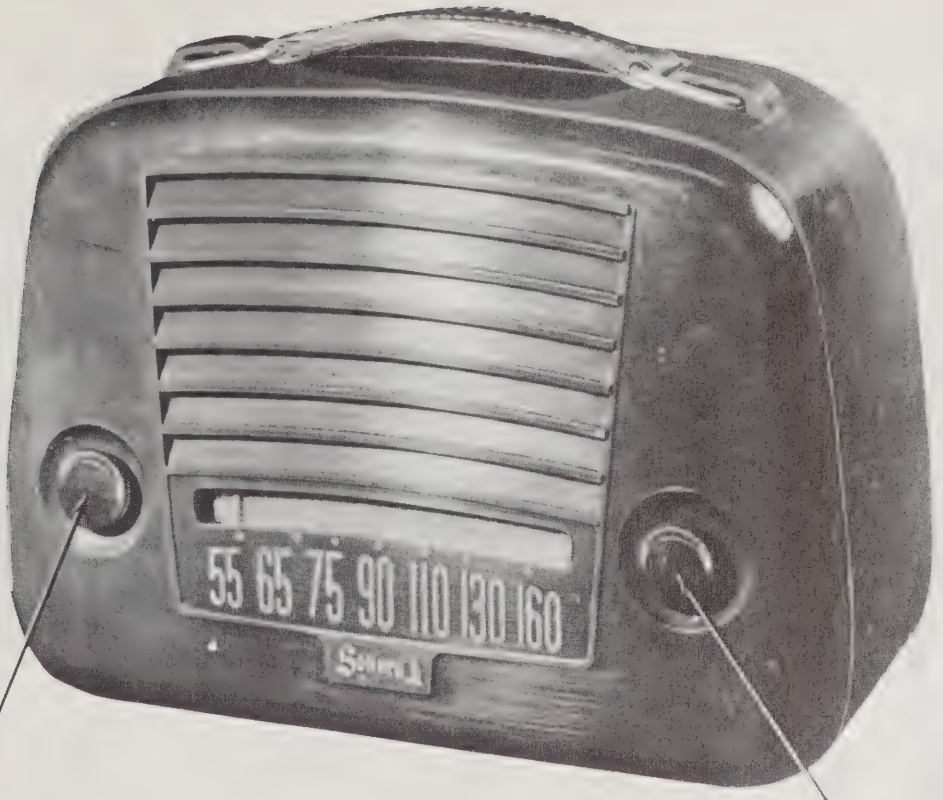
CHASSIS—TOP VIEW



CHASSIS—BOTTOM VIEW



SONORA MODEL 101
BATTERY OPERATED



SONORA MODEL 101
BATTERY OPERATED

SONORA MODEL 101

TRADE NAME	Sonora, Model 101
MANUFACTURER	Sonora Radio & Tele. Corp., 325 N. Hoyne Ave., Chicago, Ill.
TYPE SET	Battery Operated Portable Superheterodyne Receiver with Loop Antenna
TUBES (FOUR)	Types, 1R5 Converter, 1U4 IF Amp., 1U5 Det.-AVC-AF, 3S4 Power Output.
POWER SUPPLY RATING	4.5 Volts "A" Supply and 67.5 Volts "B" Supply 100MA @ 4.5 Volts DC and 8MA @ 67.5 Volts DC
TUNING RANGE—BROADCAST	535-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet. Volume control should be maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to Pin 6 (grid) of 1R5. Low side to chassis.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. Two peaks may be obtained. Adjust to one with slug farthest out of coil.
2		Loop	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	1400KC	Tune for maximum output.	"	A6	Adjust for maximum output.

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DATE 10/48-#4818-24 SET #48-FOLDER #24

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		SONORA PART No.	STANDARD REPLACEMENT		
1	Converter	1R5	1R5	7AT	
2	IF Amp.	1U4	1U4	6AR	
3	Det.-AVC-AF	1U5	1U5	6BW	
4	Power Output	3S4	3S4	7BA	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	SONORA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
5	6	150	N1367	PRS150-8	BR8I5	M-8-150	UT-81	Power Supply Bypass
6	.002	600	N6377	684-002	DT6D2	ST-6-002	TC-22	Output Plate Bypass
7	.005	600	N4894	684-005	DT6D5	ST-6-005	TC-25	Audio Coupling
8	.005	600	N4894	684-005	DT6D5	ST-6-005	TC-25	" "
9	.01	400	N1344	484-01	DT4S1	ST-4-01	TC-11	AF Screen Bypass
10	.01	400	N1344	484-01	DT4S1	ST-4-01	TC-11	IF Grid Filter
11	.1	200	N1351	484-.1	DT4P1	ST-4-1	TC-1	Fil. Bypass
12	.05	200	N1345	484-05	DT4S5	ST-4-05	TC-15	Osc. Decoup.
13	.05	200	N1345	484-05	DT4S5	ST-4-05	TC-15	AVC Filter
14	100	500	N6015	1468-0001	5W5T1	MO.5-31	1FM-31	AF Plate Bypass-Cer.
15	100	500	N6015	1468-0001	5W5T1	MO.5-31	1FM-31	Diode RF Filter- "

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	SONORA PART No.	IRC PART No.	CLAROSTAT PART No.	
16A	1 Meg.	½	N-6779	D13-137*	AM-63-Z*	Volume Control
B	Shaft		Not Req.	E	KSS-3	Attach to 16A per instructions
C	Switch		" "	42	SW-A2	" " " " "

*Install a 47KΩ resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control (Controls viewed from shaft side, terminals down.)

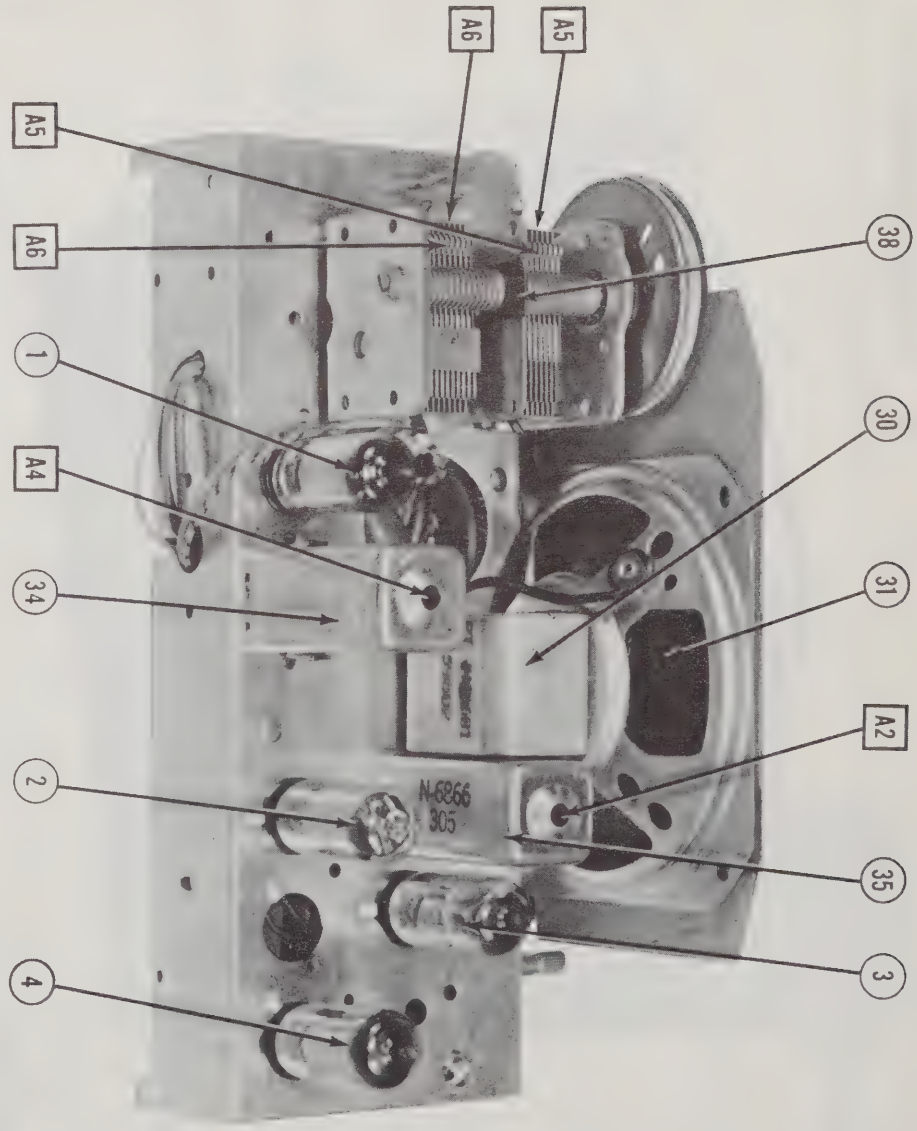
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	SONORA PART No.	IRC PART No.	
17	100KΩ	½	N-2973	BTS-100K	Br.-Blk.-Yl. Osc. Grid
18	12KΩ	½	N-5690	BTS-12K	Br.-Red-Or. Conv. Screen Decoupling
19	4.7 Meg.	½	N-4061	BTS-4.7 Meg.	Yl.-Vi.-Grn. AVC Network
20	6.8 Meg.	½	N-4028	BTS-6.8 Meg.	Blue-Gray-Grn. AF Grid
21	1 Meg.	½	N-6779	BTS-1 Meg.	Br.-Blk.-Grn. AF Plate Load
22	3.9 Meg.	½	N-5473	BTS-3.9 Meg.	Or.-white-Grn. AF Screen
23	820Ω	½	N-4279	BTS-820	Gray-Red-Br. Filament String
24	2.2 Meg.	½	N-4277	BTS-2.2 Meg.	Red-Red-Grn. Output Grid
25	27Ω	½	N-6792	BW-½-27	Red-Vi.-Blk. Fil. String
26	1200Ω	½	N-6793	BTS-1200	Br.-Red-Red Fil. String
27	680Ω	½	N-4228	BTS-680	Blue-Gray-Br. Bias
28	6.8 Meg.	½	N-4028	BTS-6.8 Meg.	Blue-Gray-Grn. IF Grid

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		SONORA PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
29	6000Ω	3.4Ω	485Ω	.6Ω	N-6791	A-3878	T22S47	A-2931	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: SONORA PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
30	FIELD PM	VC IMP. 3.4Ω	N-6681	ST-113 Mod. P4-X	4A07	
31	CONE DIA. 4"	VC DIA. 9/16"				

R F COILS

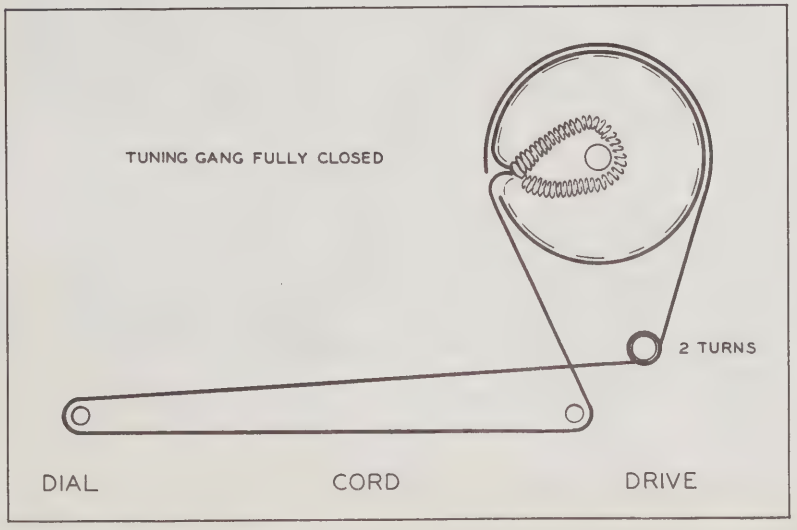
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: SONORA PART No.	MEISSNER PART No.	
32	Loop Ant.		1.2Ω	N-6781		
33	Osc. Coil	2.5Ω	7Ω	N-6003	14-1060*	*Add 50 MMFD from high side of tuning cap. to osc. grid.
34	Input IF	21Ω	21Ω	N-6865	16-6668	
35	Output IF	20Ω	20Ω	N-6866	16-6669	

BATTERIES

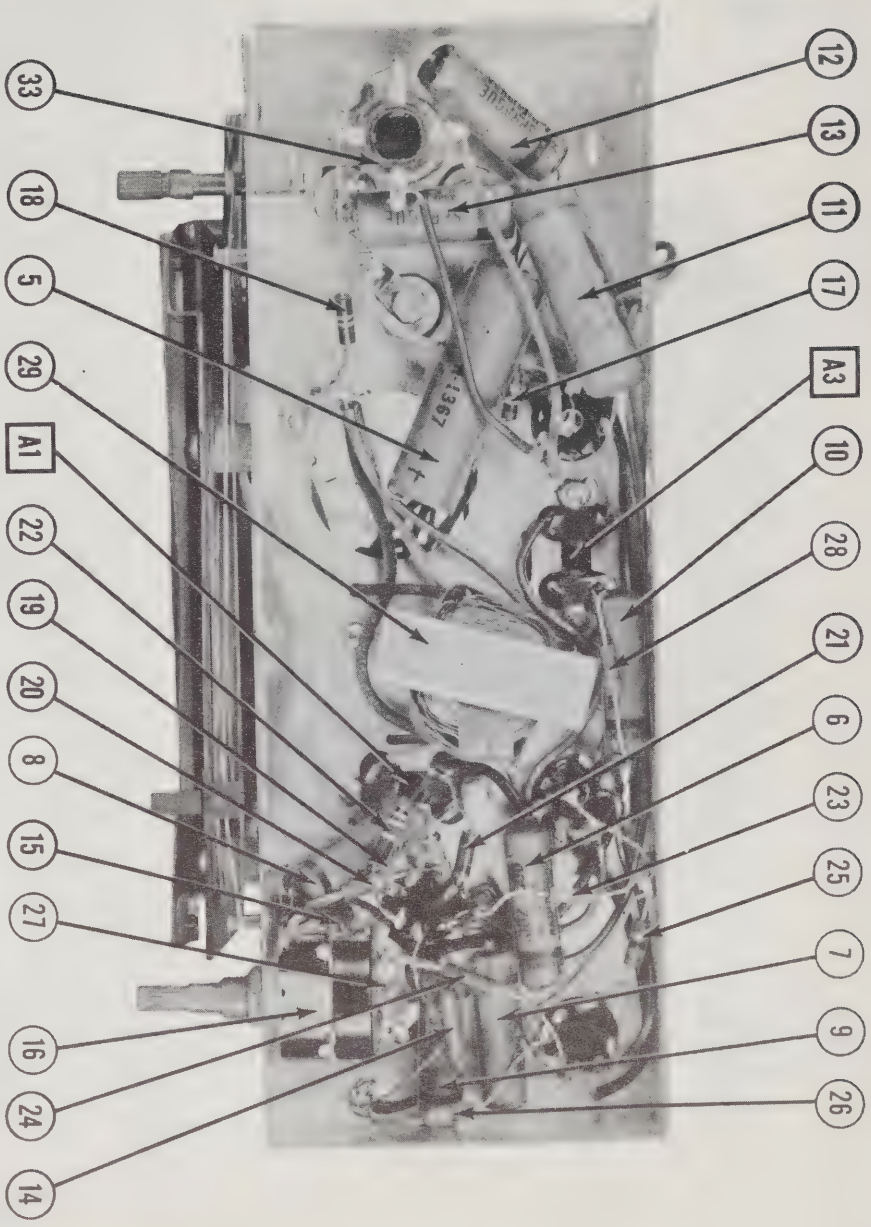
ITEM No.	VOLTAGE	SONORA PART No.	REPLACEMENT DATA: EVEREADY "A"	EVEREADY "B"	EVEREADY "A-B"	BURGESS "A"	BURGESS "B"	BURGESS "A-B"	INSTALLATION NOTES
36	4.5V "A"		746			G3			
37	67.5V"B"			467			XX45		

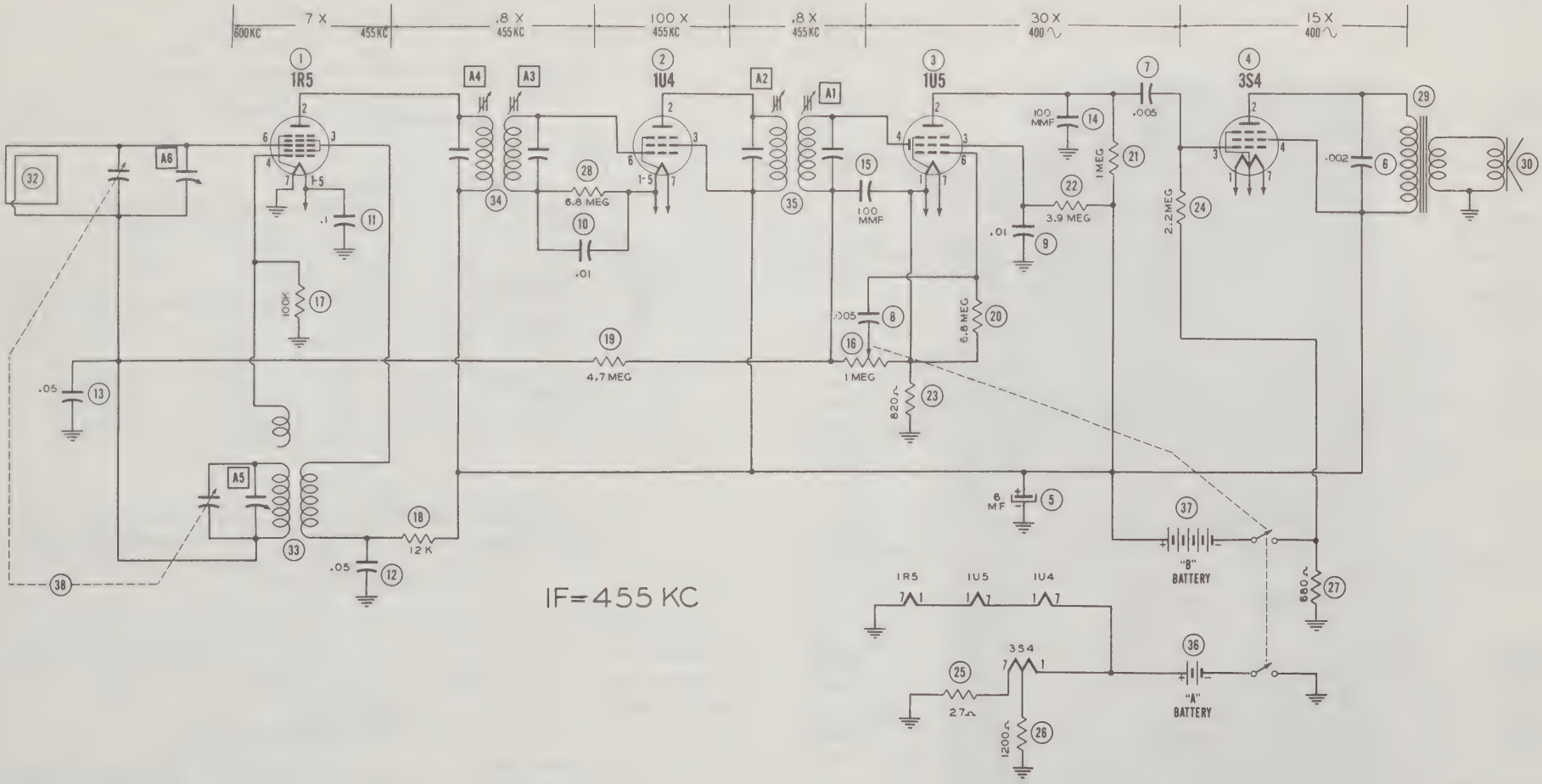
MISCELLANEOUS

ITEM No.	PART NAME	SONORA PART No.	NOTES
38	2 Gang Var. Cap.	N-5936	(27-372MMF, 35-194MMF)



CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	1.4VDC	60VDC	40VDC	-9.8VDC§	1.4VDC	0V.	0V.
2	1U4	3VDC	60VDC	60VDC	0V.	3VDC	0V.	4.4VDC
3	1U5	1.4VDC	12VDC	11VDC	.3VDC	0V.	0V.	3VDC
4	3S4	4.4VDC	58VDC	-.4VDC	60VDC	2.8VDC	58VDC	1.4VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	*	170KΩ	180KΩ	100KΩ	*	5.7 Meg.	0Ω
2	1U4	*	170KΩ	170KΩ	INF.	*	6.8 Meg.	*
3	1U5	*	1.2 Meg.	4.1 Meg.	1 Meg.	5 Meg.	6.8 Meg.	*
4	3S4	*	170KΩ	2.2 Meg.	170KΩ	*	170KΩ	*

*DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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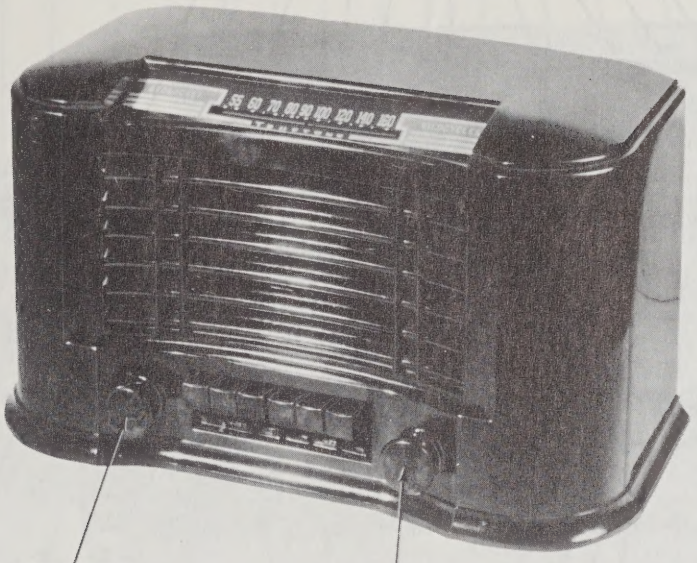
The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by shorting AVC to chassis.

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
5 - Volume control at maximum, no signal applied for voltage measurements.

TRUETONE
MODEL D2815



TRUETONE MODEL D2815

TRADE NAME	Truetone, Model D2815
SUPPLIER	Western Auto Supply Co., 2107 Grand Ave., Kansas City, Mo.
TYPE SET	AC-DC operated Superheterodyne Receiver with Loop Ant.
TUBES (SIX)	Types, 12SK7GT RF Amp., 12SA7GT Converter, 12SK7GT IF Amp. 12SQ7GT Det.-AVC-AF, 35L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	105-125 Volts AC-DC
TUNING RANGE—BROADCAST	530 - 1600KC RATING .23 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use an isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.

Loop should be maintained in same relative position to chassis as when receiver is in cabinet. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1 MFD.	High side to large stator of tuning cap. Low side to B-.	455KC	Tuning cap. fully open.	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD. to reduce hum modulation.
2.	.1 MFD.	High side to large stator of tuning cap. Low side to B-.	1600KC	Tuning cap. fully open.	Across voice coil	A5	Adjust for maximum output.
3.	200 MMFD	High side to external Ant. clip Low side to B-.	1400KC	Tune for maximum output.	Across voice coil	A6	Adjust for maximum output.

PUSHBUTTON ADJUSTMENTS

1. Turn set on and allow it to warm up for at least fifteen minutes.
2. Turn tuning cap. fully closed.
3. Loosen set screw at extreme left end of tuning cap. shaft.
4. Depress the first button firmly and hold down while manually tuning in the first station desired to be set up.
5. To set up the remaining buttons follow the procedure outlined above.
6. Turn tuning cap. fully closed and tighten set screw firmly.
7. Check the adjustment of each button by detuning with the manual tuning control and retuning with the pushbutton. If any button is out of adjustment repeat Steps 2, 3, 4 and 6.

HOWARD W. SAMS & CO., INC. **Indianapolis Indiana**

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PARTS LIST AND DESCRIPTIONS

TRUETONE MODEL D2815

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: TRUETONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	12SK7GT	12SK7GT	8N	
2	Converter	12SA7GT	12SA7GT	8AD	
3	IF Amp.	12SK7GT	12SK7GT	8N	
4	Det.-AVC-AF	12SQ7GT	12SQ7GT	8Q	
5	Power Output	35L6GT	35L6GT	7AC	
6	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: TRUETONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
7A	40	150	A-8C-10077	AF844D	UP42215	DY-403020-150	EL-224	Filter
B	20	150						"
C	20	150						"
8	.1	400	C-8D-10760	484-.1	DT4P1	ST-4-1	TC-1	Line Filter
9	.1	400	C-8D-10760	484-.1	DT4P1	ST-4-1	72P2	Line Isolation
10	.01	400	C-8D-10761	484-.01	DT4S1	ST-4-01	TC-11	Output Plate Bypass
11	.01	400	C-8D-10761	484-.01	DT4S1	ST-4-01	TC-11	Audio Coupling
12	.002	600	C-8D-10778	684-.002	DT6D2	ST-6-002	TC-22	" "
13	.006	600	C-8D-10785	684-.006	DT6D6	ST-6-006	TC-26	Tone Compensation
14	.1	200	C-8D-10771	484-.1	DT2P1	ST-2-1	TC-1	RF Bypass Power Supply
15	.05	200	C-8D-10770	484-.05	DT2S5	ST-4-05	TC-15	AVC Filter
16	.002	600	C-8D-10778	684-.002	DT6D2	ST-6-002	TC-22	Ext. Ant. Coupling
17	100	500	C-8F3-8	1468- .0001	5W5T1	M0.5-31	1FM-31	AF Plate Bypass
18	220	500	C-8F3-10	1468-.0002	5W5T2	M0.5-32	1FM-32	Diode RF Filter
19	100	500	C-8F3-8	1468-.0001	5W5T1	M0.5-31	1FM-31	" " "
20	100	500	C-8F3-8	1468-.0001	5W5T1	M0.5-31	1FM-31	Osc. Grid Cap
21	100	500	C-8F3-8	1468-.0001	5W5T1	M0.5-31	1FM-31	RF Coupling
22	100	500	C-8F3-8	1468-.0001	5W5T1	M0.5-31	1FM-31	" "

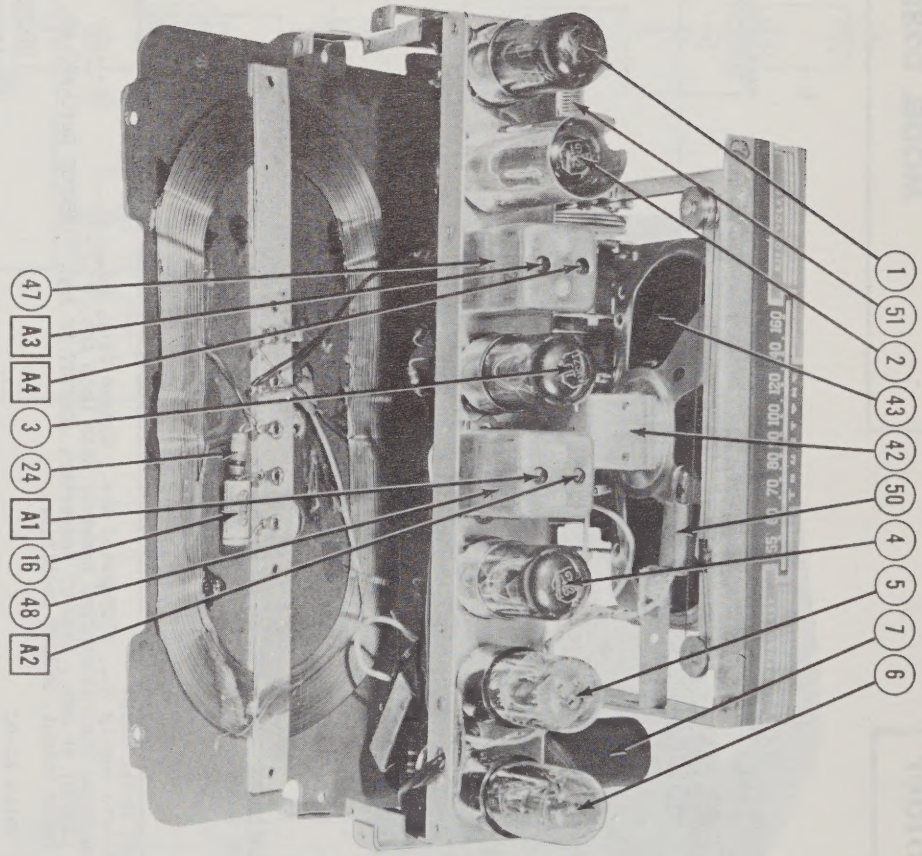
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: TRUETONE PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
23(A)	1 Meg.	½	A10A-11603	D18-137X	AT-102	Volume Control tapped @ 100KΩ
(B)	Shaft		Not Req.	E	KSS-5	Attach to 23A per instructions.
(C)	Switch		Not Req.	41	SW-A	" " " " "

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: TRUETONE PART No.	IRC PART No.	IDENTIFICATION CODES
24	1000Ω	½		BTS-1000	Br.-Blk.-Red Ext. Ant. Loading
25	4700Ω	½	C-9B1-70	BTS-4700	Yl.-Vi.-Red RF Plate Load
26	33KΩ	½	C-9B1-80	BTS-33K	Or.-Or.-Or. Conv. Grid
27	22KΩ	½	C-9B1-78	BTS-22K	Red-Red-Or. Osc. Grid
28	180Ω	½	C-9B1-53	BW-½-180	Br.-Gray-Br. IF Cathode
29	3.3 Meg.	½	C-9B1-34	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
30	47KΩ	½	C-9B1-82	BTS-47K	Yl.-Vi.-Or. Diode Filter
31	4.7 Meg.	½	C-9B1-35	BTS-4.7 Meg.	Yl.-Vi.-Grn. AF Grid
32	220KΩ	½	C-9B1-90	BTS-220K	Red- Red- Yl. AF Plate Load
33	470KΩ	½	C-9B1-94	BTS-470K	Yl.-Vi.-Yl. Output Grid
34	150Ω	½	C-9B2-52	BW-½-150	Br.-Grn.-Br. Output Cathode
35	270KΩ	½	C-9B1-91	BTS-270K	Red-Vi.- Yl. Tone Compensation
36	1200Ω	1	C-9B2-63	BTA-1200	Br.-Red-Red Filter
37	220Ω	1	C-9B2-54	BW-1-220	Red-Red-Br. "
38	22Ω	½	C-9B1-3	BW-½-22	Red-Red-Blk. Rectifier Ballast
39	33Ω	1	C-9B2-44	BW-1-33	Or.-Or.-Blk. Line Dropping
40	220KΩ	½	C-9B1-90	BTS-220K	Red-Red-Yl. Line Isolation

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		TRUETONE PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
41	4100Ω	4.0Ω	275Ω	.5Ω	B-12C-10623	A-3856	T22S46	A-2900	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			TRUETONE PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.				
42	PM	4.0Ω	B-18A-10647		5A15†	†Fabricate new mounting bracket.
	CONE DIA.	VC DIA.				
43	4x6"	9/16"				

R F COILS

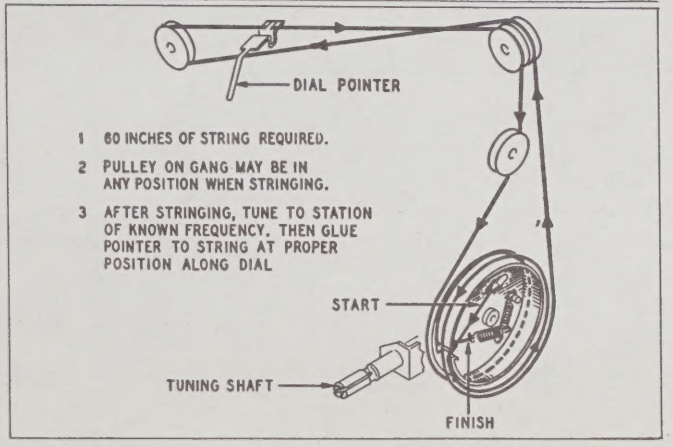
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	TRUETONE PART No.	MEISSNER PART No.	
44	Loop Ant.	.2Ω	1.4Ω	C-201-10908-1		
45	RF Grid Coil		87Ω	A-16A-10792		
46	Osc. Coil	.6Ω	4Ω*	A-13D-10661*	14-1060	*Some sets may have Osc. Coil Part No. A-13D-12082
47	Input IF	40Ω	38Ω	B-13B-10091-1	16-6658	
48	Output IF	27Ω	38Ω	B-13B-10092-1	16-6660	
49	IF Choke		0Ω	A-16A-1216A		

DIAL LIGHT

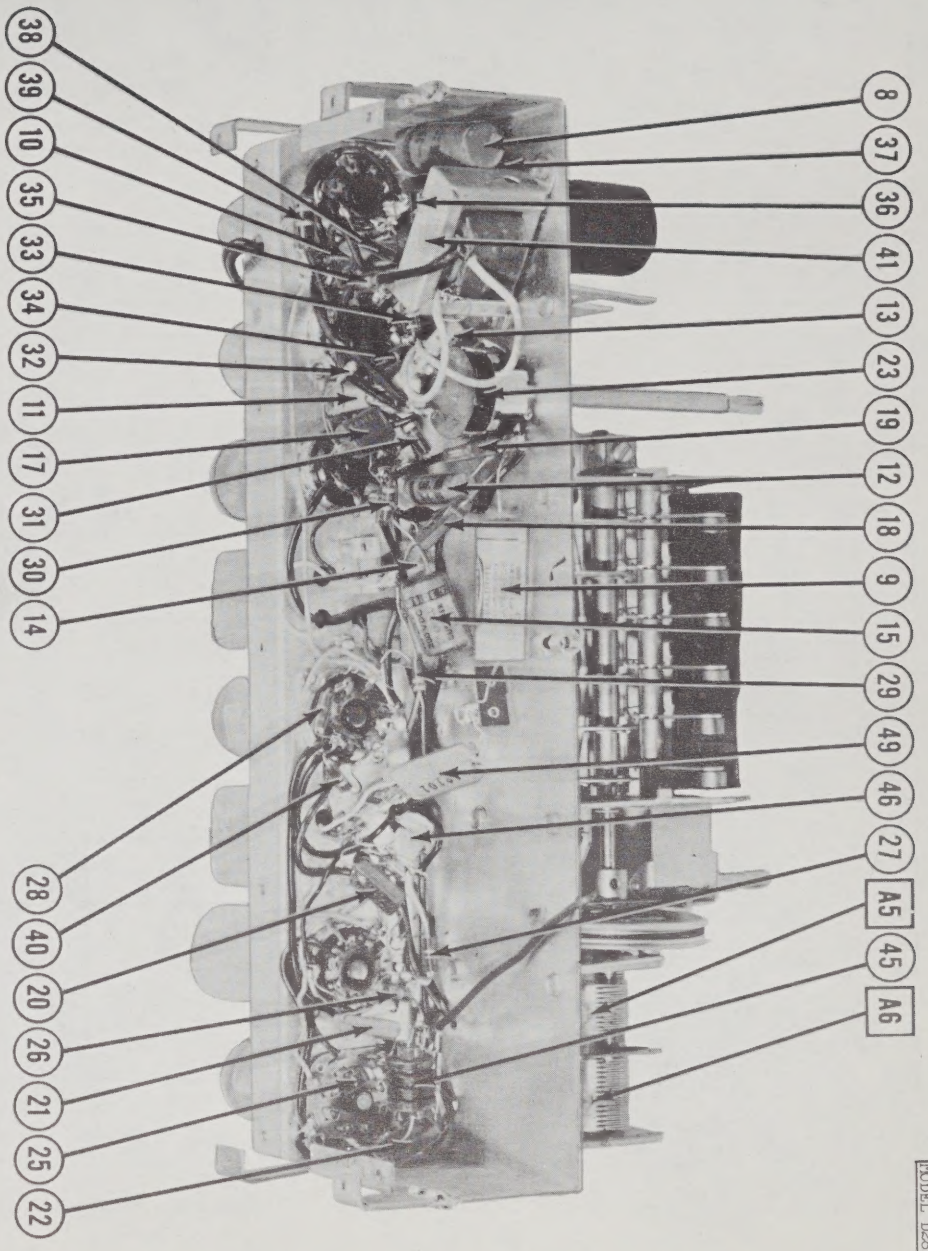
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					TRUETONE PART No.		
50	Bayonet	6-8V	0.15A	Brown	A-46A-10793		Type 47

MISCELLANEOUS

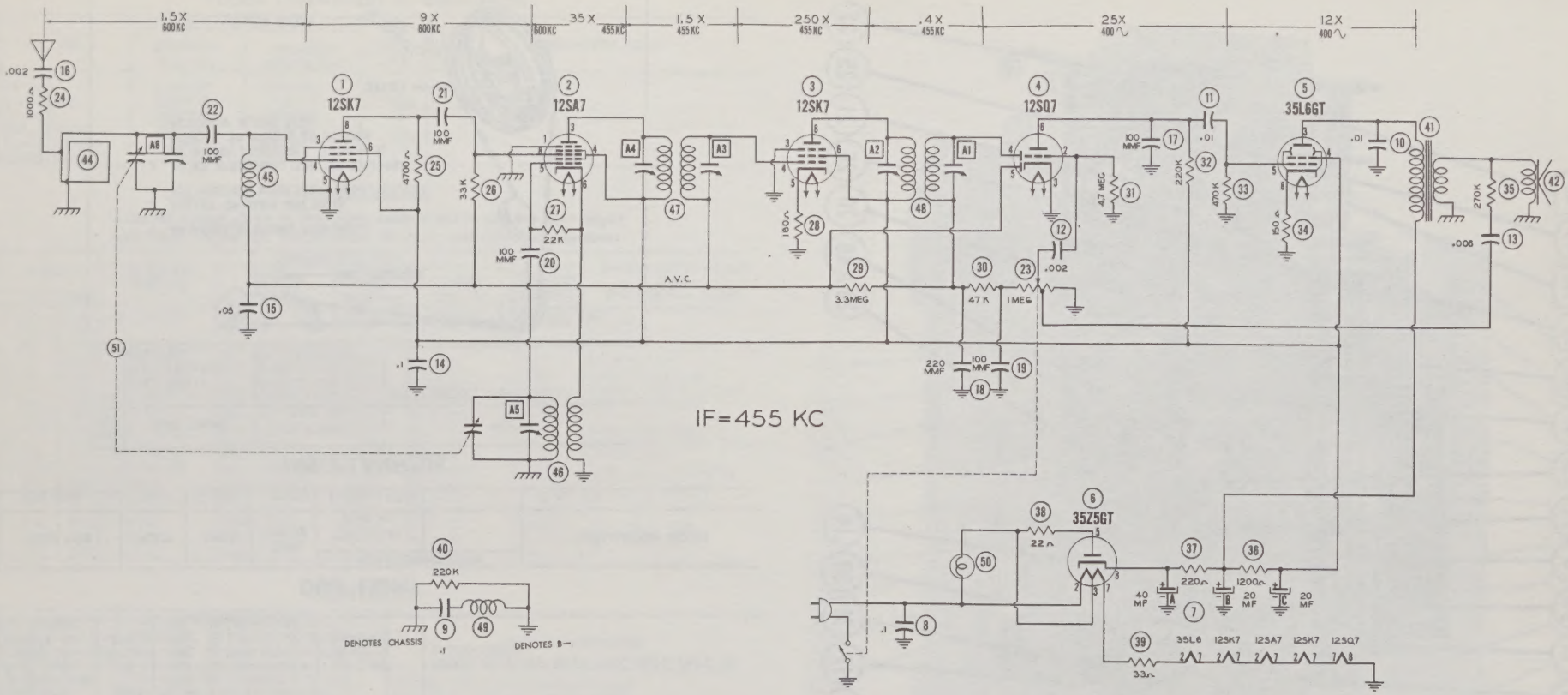
ITEM No.	PART NAME	TRUETONE PART No.	NOTES
51	2 Gang Var. Cap.	B-8A-10827	(25-508MMF, 32-200MMF)
	Dial Scale	B-6D-13065-1	
	Dial Pointer	A-2G-10639	
	Cabinet	56-10010-36	


DIAL POINTER
1 60 INCHES OF STRING REQUIRED.
2 PULLEY ON GANG MAY BE IN ANY POSITION WHEN STRINGING.
3 AFTER STRINGING, TUNE TO STATION OF KNOWN FREQUENCY. THEN GLUE POINTER TO STRING AT PROPER POSITION ALONG DIAL
START
TUNING SHAFT
FINISH

CHASSIS—BOTTOM VIEW



TRUETONE MODEL D2815



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SK7GT	0V.	47VAC	0V.	-.6VDC	0V.	70VDC	35VAC	30VDC
2	12SA7GT	0V.	35VAC	70VDC	70VDC	-8.6VDC§	0V.	22VAC	-.6VDC
3	12SK7GT	0V.	22VAC	0V.	-.6VDC	1.5VDC	70VDC	11VAC	70VDC
4	12SQ7GT	0V.	-.8VDC	0V.	-.6VDC	-.6VDC	45VDC	11VAC	0V.
5	35L6GT	0V.	75VAC	100VDC	70VDC	0V.	0V.	47VAC	4.2VDC
6	35Z5GT	0V.	117VAC	111VAC	0V.	107VAC	0V.	80VAC	120VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SK7GT	220KΩ	54Ω	0Ω	4.3 Meg.	0Ω	60KΩ	40Ω	65KΩ
2	12SA7GT	220KΩ	40Ω	60KΩ	60KΩ	22KΩ	.6Ω	27Ω	4.3 Meg.
3	12SK7GT	220KΩ	27Ω	0Ω	4.3 Meg	180Ω	60KΩ	13Ω	60KΩ
4	12SQ7GT	220KΩ	4.7 Meg.	0Ω	1 Meg.	4.3 Meg.	280KΩ	13Ω	0Ω
5	35L6GT	INF.	90Ω	60KΩ	60KΩ	470KΩ	INF.	54Ω	150Ω
6	35Z5GT	INF.	150Ω	140Ω	INF.	170Ω	INF.	120Ω	60KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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4818-25

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of + 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.